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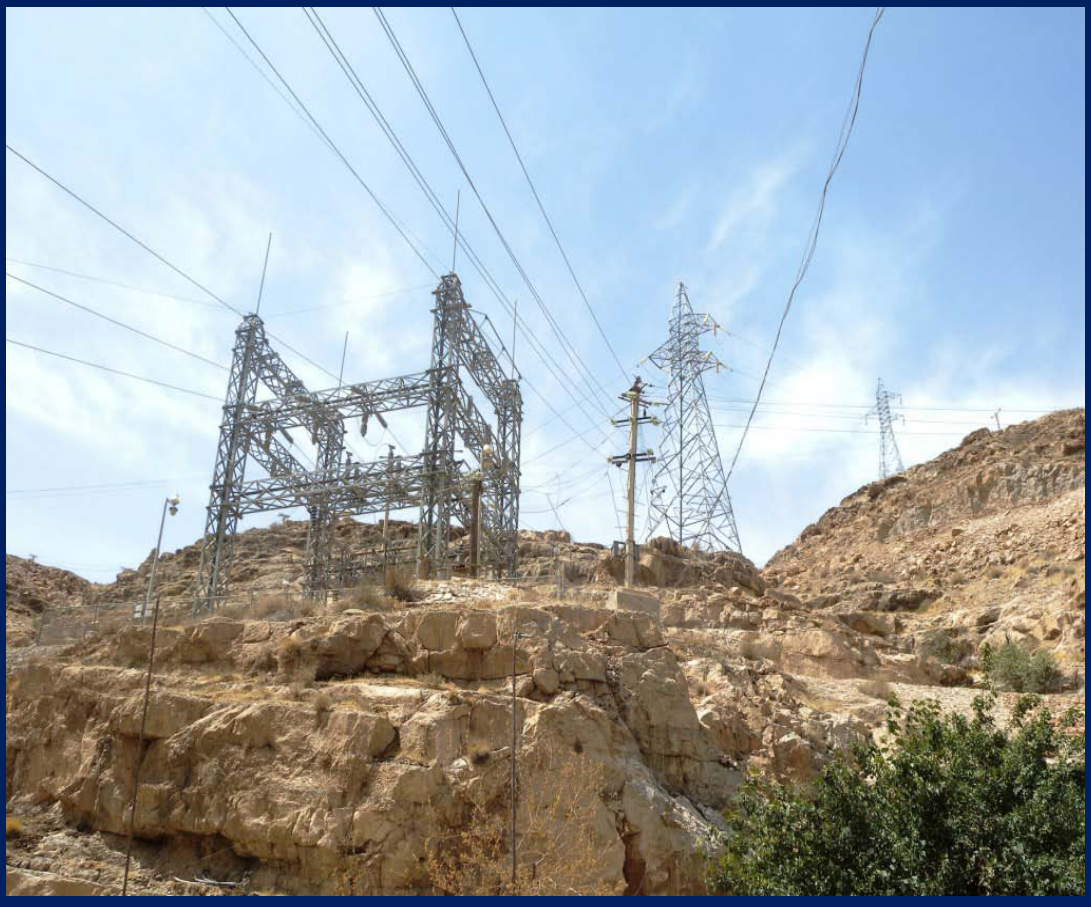
# KANDAHAR AND LASHKAR GAH ELECTRICAL SUPPLY SOCIO-ECONOMIC IMPACT ASSESSMENT



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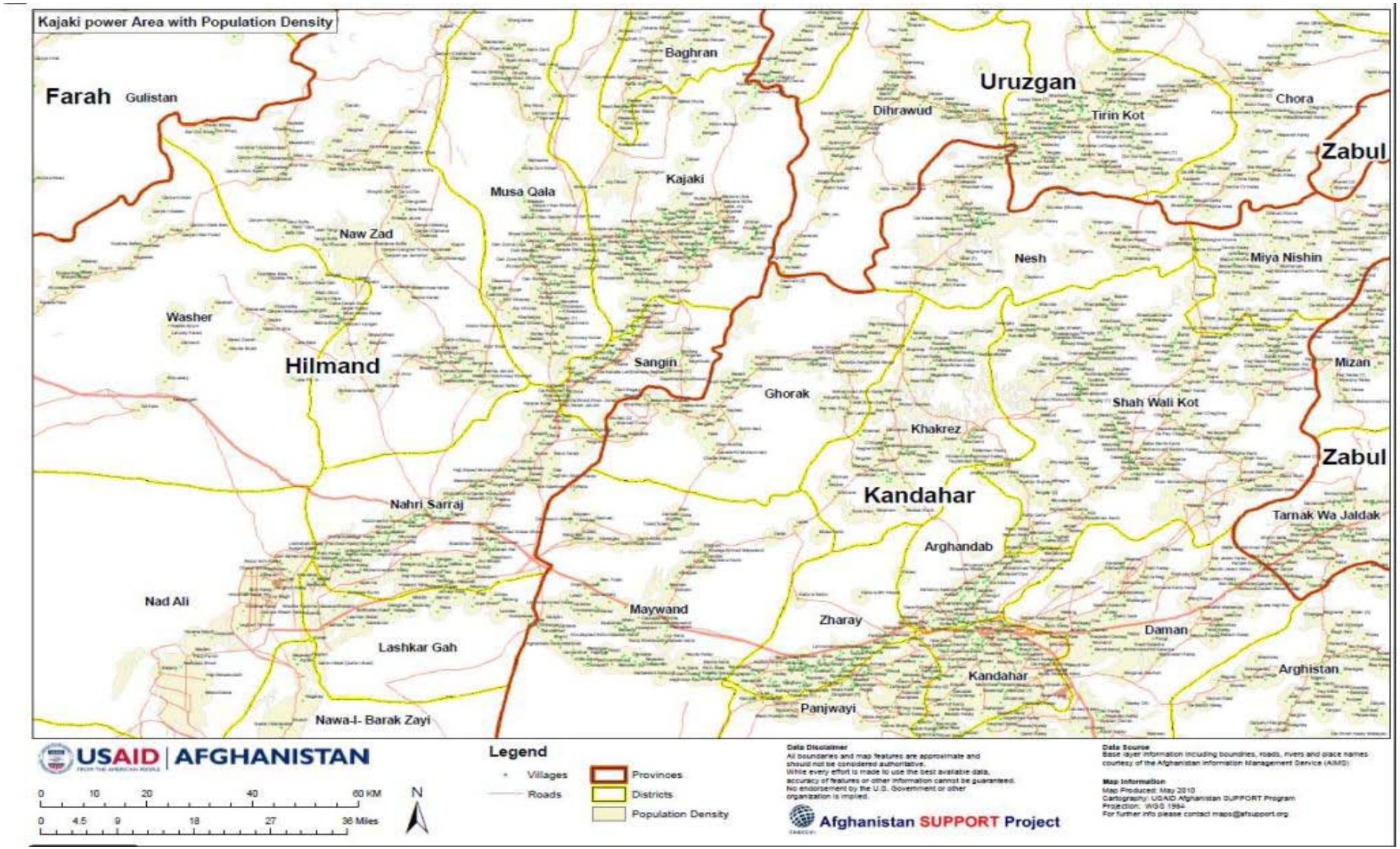
# ACRONYMS

| | |
|---|---|
| **ACEP** | Afghanistan Clean Energy Project |
| **ADB** | Asian Development Bank |
| **AEIC** | Afghanistan Energy Information Centre |
| **AIRP** | Afghanistan Infrastructure and Rehabilitation Program |
| **AISA** | Afghan Investment Support Agency |
| **ANDS** | Afghanistan National Development Strategy |
| **AREU** | Afghanistan Research & Evaluation Unit |
| **CIDA** | Canadian International Development Agency |
| **CDC** | Community Development Council |
| **COIN** | Counter-insurgency |
| **DABM** | Da Afghanistan Breshna Moassessa |
| **DABS** | Da Afghanistan Breshna Sherkat |
| **DANIDA** | Danish International Development Agency |
| **DfID** | Department for International Development [UK] |
| **DPP** | Diesel Power Plant |
| **EGGI** | Economic Growth and Governance Initiative project |
| **ESA** | Electrical Supply Area |
| **GTZ** | German Technical Cooperation |
| **HH** | Households |
| **HPP** | Hydro Power Plant |
| **ICE** | Inter-Ministerial Commission for Energy |
| **ICT** | Information and Communication Technology |
| **IPP** | Independent Power Producers |
| **IROA** | Islamic Republic of Afghanistan |
| **ISAF** | International Security Assistance Force |
| **JICA** | Japan International Cooperation Agency |
| **KIP** | Kandahar Industrial Park |
| **KWh** | Kilowatt-Hour |
| **L-G** | Lashkar Gah |
| **MACCA** | Mine Action Coordination Centre of Afghanistan |
| **MAIL** | Ministry of Agriculture, Irrigation and Livestock |
| **MEW** | Ministry of Energy & Water |
| **MPH** | Ministry of Public Health |
| **MRRD** | Ministry of Rural Rehabilitation & Development |
| **MW** | Megawatt |
| **MWh** | Megawatt-Hour |
| **NEPS** | North East Power System |
| **NSP** | National Solidarity Program |
| **SEPS** | South East Power System |
| **SESA** | Sustainable Energy Services Afghanistan |
| **SHS** | Solar Home Systems |
| **SOW** | Scope of Work |
| **UNDOC** | United Nations Office on Drugs and Crime |
| **USAID** | United States Agency for International Development |
| **USG** | United States Government |
| **WB** | World Bank |


Kajaki power Area with Population Density
Farah
Gulistan
Baghran
Uruzgan
Dihrawud
Tirin Kot
Chora
Zabul
Musa Qala
Kajaki
Naw Zad
Nesh
Miya Nishin
Washer
Hilmand
Sangin
Mizan
Ghorak
Shah Wali Kot
Khakrez
Zabul
Kandahar
Nahri Sarraj
Tarnak Wa Jaldak
Arghandab
Nad Ali
Maywand
Zharay
Daman
Lashkar Gah
Arghistan
Kandahar
Panjwayi
Nawa-I- Barak Zayi
USAID | AFGHANISTAN
0 10 20 40 60 KM
0 4.5 9 18 27 36 Miles
N
Legend
Villages
Roads
Provinces
Districts
Population Density
Data Disclaimer
All boundaries and map features are approximate and should not be considered authoritative.
While every effort is made to use the best available data, accuracy of features or other information cannot be guaranteed.
No endorsement by the U.S. Government or other organization is implied.
Afghanistan SUPPORT Project
Data Source
Base layer information including boundries, roads, rivers and place names courtesy of the Afghanistan Information Management Service (AIMS)
Map Information
Map Produced: May 2010
Cartography: USAID Afghanistan SUPPORT Program
Projection: WGS 1984
For further info please contact maps@afsupport.org

# 1.0 EXECUTIVE SUMMARY

***Differences in Power Supply Generated and Available in the ESA***

- **Power** is a **top priority** in Afghanistan along with water, roads, security, anti-corruption, education and jobs[1]. Electricity is widely viewed as a basic need and fundamental to development as it enables lighting, cooling, heating, information, entertainment and production activities such as irrigation, bakeries and welding. Lack of access to electricity is a brake on progress in all sectors of the economy.
- **Donors** have traditionally taken an active interest in **infrastructure development**, particularly expanding the supply of electricity and improving the distribution system. During 2003-09, USAID rehabilitated Kajaki Hydro Power Plant and installed Diesel Power Plants and substations in Kandahar and Lashkar Gah.
- These **energy investments** tripled grid electricity **supply capacity** to 51 MW and significantly reduced electricity rationing in the 5 study districts - Kandahar City, and Lashkar Gah, Sangin, Kajaki and Musa Qala in Helmand Province.
- Yet despite this considerable increase in supply capacity, power generated has failed to keep up with demand in the Electricity Supply Area. It is estimated that the current **shortage** of 38 MW in the 5 study districts will increase to 62MW by 2015 if nothing is done about electricity supply[2].
- According to the state electrical utility DABS, **load-shedding** is at present about 50% in the 5 study districts yet anecdotal evidence suggests the reality is much worse due to 3 factors - system loss [aging infrastructure for generating, transmitting and distributing electricity], disruption [sabotage to towers and lines by insurgents] and leakage [theft through illegal connections].
- Repeated attempts to obtain information from **DABS** on power generated from Kajaki HPP and the DPPs, and power received by end-users, yielded **data discrepancies and gaps.** DABS inability to provide real time accurate data is one symptom of its weak organizational capacity. Understandably, no data is available since 2005 for the Taliban controlled northern Helmand.

***Socio-Economic Impact of On-Grid Electrification in the ESA***

- USAID initiated this socio-economic impact study to determine how improvements in electricity supply had affected the lives and livelihoods of residents in the study area. **An end-user survey of households, markets and settlements** was therefore deemed necessary. Unfortunately, no comprehensive baseline data was available and therefore a comparative analysis approach was

[1] Electricity shortage was the top concern for business people in Kandahar and Jalalabad in Afghan Business Survey, Centre for International Enterprise 2009.

[2] Interministerial Committee on Energy [ICE] predicts power demand will double in Afghanistan by 2014.

employed using non-electrified households within ESA and control groups outside the ESA. In addition to field research, documentation review, stakeholder consultation and donor meetings helped to contextuate the findings and analysis.

- A **scoping survey** in the study districts found 14 city wards, 18 'commercial' villages [5 or more production units and/or market stalls], and 377 rural settlements [less than five or zero]. 16 grid connected wards were selected for the survey plus 16 non-electrified as a control group, as well as 26 markets, 130 stalls/units, and 400 households –160 grid connected households and 160 non-electrified within the ESA, plus 80 outside the ESA as a control group. 9 different sets of questionnaires were developed and **604 questionnaires** were completed.
- Performing a field survey in a **war zone** presents unique challenges as not only were enumerators under real danger from the insurgents but also the respondents for cooperating with the survey. Random sampling entailed finding 'permissive' community leaders to advise on 'friendlies' in a village, and completed forms had to be smuggled to Kabul for encoding. The field visit by the study team to Kajaki, Kandahar and Helmand to inspect assets, meet beneficiaries and monitor the survey team was also constrained by restrictions on movement.
- Socio-economic impacts of electrification are **multifaceted** – household level effects can be both inside the home [e.g. modern conveniences] and outside the home [e.g. commercial, agricultural], benefits can also be external [i.e. flow to non-electrified residents within a connected settlements], as well as direct [mostly economic in nature such as businesses and jobs] and indirect [social and cultural including education, health, security etc.].
- The field survey carried out during June 2010 yielded the following results*:*
    - there was evidence of increasing **incomes** in households since grid connection – incomes of grid connected city households were 4x those outside the ESA and 14x non-electrified city households, while over 2/3 connected city households and 1/5 commercial villages said that family incomes had risen since electrification;
    - however, this was not enough to lift people out of **poverty** in a significant way – 80% of sample households are still below the poverty line;
    - **expenditure** patterns of grid-connected households indicated spending on food, clothing, health and energy, then a variety of energy consuming domestic appliances such as radios, TVs, fridges, computers, cookers, irons and fans, and finally schooling, recreation and transportation;
    - as a result of electrification, **employment** increased – jobs tended to be higher in commercial villages [average 5.6 per household] than in City wards [average 3 jobs] but in the latter there was much more variety in occupations [12 versus 3], and after sun set there was more economic activity in grid-connected households than in non-electrified ones;

- in terms of **asset accumulation**, grid-connected households owned far more electrical appliances than non-electrified homes, with the exception of radios that were fairly ubiquitous as they can be powered by batteries, and also water pumps with ownership was higher in villages;
- due to 'load shedding' or power interruptions many grid-connected households [30% in City, 69% in commercial villages and 59% rural] were forced to use back-up diesel generators, then car batteries, kerosene and finally timber as an **alternate power** source ;
- 100% of connected households **use electricity** for lighting, while 60% of connected City households use electricity for cooking and 11% for heating – all markets tended to use electricity for light and heat, and in commercial villages in particular electricity was used for production purposes as well;
- in terms of **rationing**, it was reported that public electricity was **available** in City wards on average 15 days per month [with 7 hours on allocated days], 11 days in commercial villages [13 hours on allocated days] and 6 days in rural villages [10 hours on allocated days][3];
- city households reported **consuming** on average 362 kwh monthly that was double that consumed by commercial villages, and the monthly charge ranged from 678 to 871afs per household with the cost in villages being much higher per kwh likely due to the fact that all connected city households had a meter while only 1/3 commercial villages and 5% of rural villages, leaving open possibility for officials to over-estimate usage;
- access to affordable grid electricity, particularly after rehabilitation of Kajaki hydro power plant, encouraged growth of **markets**, and enabled individual **commercial** stalls/shops/units to increase sales, employment and investment – mostly at the expense of rural villages but the upgrading of roads may also have been a factor in their trading decline;
- as for **agriculture**, there was no difference between connected and non-connected households for land under irrigation, likely because small farmers preferred to use free gravity-fed water from irrigation canals[4];
- once grid connected, many households [one-third City, ½ commercial villages and 80% rural] reported they no longer needed to fetch **water** – this was undoubtedly a significant benefit to females;

[3] Lashkar-Gah informants stated that on allocated days, electricity was available on average 12 hours in the winter but only 2 hours in the summer.

[4] 6 Districts in Kandahar Province access the Dahla Dam canal system to irrigate 117,000 hectares mainly for crops [wheat, barley, corn], fruits [grapes, pomegranate, melons] and vegetables [garlic, onion, leeks].

- only persons in city wards perceived an improvement in access to **health** care facilities after health centers and clinics became grid-connected but this may also reflect the prevalence of medical personnel and medicines;
- after schools became connected to the grid, respondents reported that access to **education [**i.e. children's school attendance and night-time learning] increased in Cities and commercial villages but not in rural areas;
- connected City households reported that 1/3 of school-age **girls** were attending school whereas in the villages it was negligible;
- only 43% of city centers, 22% of commercial villages and 12% of rural villages reported having electrical **street lighting**;
- 68% of City households said street lighting had improved **security** while 20% of City households said street lighting had reduced **crime**, though not significantly, while outside of the City, the residents of those village with street lighting perceived no change in the security and crime situation, presumably because the lighting was inadequate;
- almost all respondents without grid electricity expressed a desire to be connected but many stated they were **unable to pay for the initial set up**[5];
- more than 2/3rd of the potential consumers stated they were **unwilling** to have electricity connection and pay for it likely due to insufficient and erratic supplies, corrupt officials and complex application procedures;
- **reasons** for wanting grid electricity were to save money [cheaper than fuel oil], to raise standard of living [modern appliances] and for safety reasons;
- many respondents indicated that the **connection** process was overly complex, they had been asked for unofficial payments, and as a result had given up on the application process;
- the vast majority of grid-connected persons were **not satisfied** with DABS due to perceived corruption, irregular supply and a bias in allocation/rationing;

The field survey clearly showed that **many benefits flowed to end-users** during this period as a direct result of the power-related interventions/investments by USAID. The additional electricity supply not only increased employment and incomes that resulted in more spending on local products thereby stimulating economic activity but also enhanced access to potable water, health care and education/learning.

***Continuing Problems and Constraints of On-Grid Electrification in the ESA***

[5] In L-G, the study team was informed that connection costs were high - registration cost 1,200 afs and a meter 1,800 afs, Some applicants were even obliged to buy from the bazaar a transformer for 10,000afs.

- Despite the many positive outcomes above arising from electrical supply improvements during 2003-09, the overall effects on people in the study districts was **limited** and **serious shortcomings remain regarding public electricity**. Factors adversely affecting electricity supply in the ESA are listed below.
    - Intermittent electricity supply due to acute ongoing power shortages, and **availability** is getting worse;
    - **erratic power** is annoying for households, inconvenient for institutions, and extremely frustrating for entrepreneurs[6];
    - **load-shedding** causes residents to turn to diesel generators but they cannot afford the high cost of diesel, and as well there have been accidents with generators[7];
    - **bias** in how electricity is made available i.e. there is a widely held belief that electricity tends to go to the "rich and powerful";
    - **fluctuating voltage** due to aged transformers and substations damages commercial machinery & equipment, as well as home appliances;
    - **widespread power theft** i.e. 'bleeding off' due to lack of enforcement;
    - **connection cost** is high and application process is seen as complex and corrupt;
    - DABS **billing system** and financial controls are flawed[8] resulting in lost revenues i.e. commercial losses;
- Problems persist because there are many supply and demand constraints on the ESA:
    - **grossly insufficient power generation capacity** in the 'south;
    - **huge system technical losses** - the difference between power generated and amount received by the end-user - between 30-40% due to aging and dilapidated electricity infrastructure;
    - **illegal connections** are pervasive - presumably because local residents are unwilling and/or unable to pay the electricity tariff to DABS;
    - **frequent disruptions** to supply since 2005 due to Taliban insurgency efforts in taking down transmission towers and cutting lines;
    - **electrical utility capacity is weak** – there are too few qualified, experienced and motivated staff [managers and engineers] and DABS is lacking the necessary financial controls and tools;

[6] Kandahar entrepreneurs told the study team that since 2003 125 factories have closed due to power shortages [Ministry of Agric. states 60] and only 7 remain but are struggling with costly diesel generators.
[7] People suffocating while running gensets indoors with no ventilation and children being poisoned.
[8] Many customers are not billed and/or bills not collected due to incompetence and/or corruption.

- **rising demand** as evidenced by huge increase in connections over last 5-years means any improved on-grid electricity power has been widely dispersed - after 2000 the Kandahar population swelled considerably[9] so fewer additional benefits accrued on a per capita basis[10];
- **cheap electricity** means people connected are perhaps using more power than necessary for domestic uses/appliances, for productive uses such as workshops and for agriculture/irrigation purposes;

***Improving Existing Electrification in the ESA***

Despite **marked improvements in electricity supply** from 2003-09 in the ESA, and concomitant progress on indicators such as jobs, income, health, education and security, the vast majority of residents and businesses in the study districts **still lack access to reliable and affordable public electricity.** Without action, by 2015 the 'south' will only receive 1/5 of what is needed i.e. 20 of 100MW. In a sense, in 2001 the electricity system was essentially 'broken' and early efforts at rehabilitation were merely 'playing catch up'.

USAID and others are well aware of the acute need for public electricity as well as the immense challenges of satisfying this need, and are taking concrete steps to improve the electricity situation in Southern Afghanistan. However, the donor community is confined by **funding constraints** and a complex, **volatile security situation**.

This study proposes a number of **recommendations** to ameliorate the power situation in Kandahar City and Helmand, and hopefully maximize short and long-term future impacts. Note that the planning for some of these suggestions to increase capacity and reduce system losses is already well advanced:

1. **add generation capacity** by immediately :
    a. **installing the 3rd turbine at Kajaki** HPP and build a **new transmission line** to carry the additional power south[11] with all additional 18MW going to Kandahar[12] - although all the turbine components are already on site, to truck in the required cement and crushing equipment means either securing the Sangin Valley or using a much more expensive airlift;
    b. **rehabilitating** or retrofitting existing generators in Kandahar and Lashkar-Gah to enhance performance and extend operating life[13];
    c. **adding additional diesel generators** in Kandahar City as a 'quick fix' measure to boost short-term supply[14], especially in the Industrial Park to

[9] Afghanistan has one of highest fertility rates in the world.
[10] Huge population growth in urban centres in Afghanistan lately – as much as 30% annually in Kabul.
[11] 1,010 towers will need to be replaced along 400 kms plus a stronger cable [180mm].
[12] Some suggest that 8MW of this should flow to L-G but the focus seems to be on Kandahar at the moment as it has 10x population of L-G and is the centre of attention for COIN.
[13] Gensets only last 7 years in 'south' even with regular maintenance and after that require major overhaul.
[14] Gradually move gensets to peri-urban areas containing economic migrants and refugees to address resentment about lack of public services – 'border towns' are a breeding ground for insurgency recruitment.

revive the light manufacturing base[15], bearing in mind that diesel is extremely costly[16], considered 'dirty' and supply routes are unstable;

d. **expanding the Lashkar-Gah DPP** by 20MW if it is decided to send all power from Kajaki 3rd turbine to Kandahar [otherwise Kandahar will need more gensets[;

e. **exploit feasible renewable energy** opportunities - the potential for renewables in Afghanistan is generally speaking, wind in the West [Herat and Balkh], micro-hydro[17] in the North and solar in the South. With respect to the 'south', there is some potential for MHP and substantial potential for solar:

   i. Of the ongoing m**icro hydro power [MHP]** initiatives below in the 'south', the first 3 will benefit Kandahar while the 4th will benefit Helmand but not Lashkar-Gar;

      - CIDA has identified 2 MHP locations on Dahla Dam irrigation canals[18] capable of generating total 4-5MW costing $50m;
      - CIDA is considering upgrading Filcoh and Baba Wali MHP for about 1MW each;
      - DfID may fund 13 micro hydro sites on Boghra irrigation canals yielding total 3MW;
      - DfID, along with ADB and DANIDA, is considering $70m upgrade of Grishk Dam [DfID already committed £11.2 million] that could yield total 4.8MW but though in Helmand will remain in Grishk as there is no link to the SEPS grid.

   ii. **Solar power** ranges from small household systems to mega 'farms':

      - The proposal to establish a $75 million 10MW solar power plant outside of Kandahar is controversial. Proponents highlight the abundance of sun in the 'south' as well as rapid advances in solar technology while skeptics, who are usually based in the field and therefore have a better sense of the realities 'on the ground', cite the extreme heat[19] and dusty conditions that necessitate 'high-level operations and maintenance' combined

[15] 30 MW is estimated of which 10MW for the Industrial Park

[16] Annual diesel bill for 30 MW gensets would be $30+ m. – compared to DABS annual grant from IROA $40 m to cover shortfall. To guarantee power for 3 years until more sustainable LT measures come into play requires $400 million of which $100m for diesel. The cost structure for diesel is 10x other sources – up to 60c kwh incl. O&M compared to 7-10c for imported power and 8c kwh for indigenous natural gas power that inflates to 10-12c with security. 25% of $50m CIDA Dahla Dam project earmarked for security.

[17] An advantage of MHP over solar is that power is available 24/7. GTZ has decentralized models in the north testing technology from Nepal and China with facilities ranging from 25KW to 0.5 MW.

[18] The main canal is 15 metres wide and features substantial drops in elevation.

[19] 50c+ in the summer is hard on components.

with the high vulnerability of solar 'farms' to insurgency rocket attacks. In their view, such power would be unreliable in the circumstances. These factors need to be thoroughly studied before any major investment decision is made to establish a large solar power plant in such a precarious site.

- In the meantime, in remote and rural areas it does not make economic sense to expand the grid, particularly when the power system is over-extended. However, **off-grid small household solar systems**[20], as well as community-owned mini-grid solar systems, should o be supported as a replacement for expensive small diesel generators and more traditional energy sources.

f. Energy planners must also strategically consider whether to support two other long-term mega projects that would enhance electricity supply in the 'south':

i. **Kajaki Dam phase 2** would yield an additional 100MW but building spillway gates to raise the water level 12 meters, installing 4 turbines and increasing transmission capacity would be a massive investment [ADB is interested but it is estimated to cost at least $200m], and donors may not have an appetite for this – what is suggested therefore is to carry out a feasibility study for a 2nd HPP at Kajaki.

ii. connecting **SEPS to NEPS** would enable power from neighboring countries to flow to the south. Because imported electricity is as cheap as hydro power, and Afghanistan needs a national grid system in long-term to take advantage of alternate power sources, it is suggested by some that this be supported. But the new 400+ km transmission line would be costly and make the country more vulnerable in terms of energy security. Afghanistan should therefore develop its own power generation sources and not rely on imported power that makes the country dependent. There are abundant indigenous sources of power such as coal and gas whose carbon emissions could be offset by taking advantage of renewables such as hydro.

2. **Secondly, reduce system losses** through greater efficiency:

a. Decrease technical losses through **infrastructure upgrading** – as mentioned previously, rehabilitate the transmission line from Kandahar-Kajaki-Lashkar Gah, and as well the associated electrical distribution system [transformers, substation, and feeder lines].

[20] For remote off-grid areas, renewables mini-grid design is compatible with the national grid to enable later hook up. 20% of NSP projects are in the energy sector supporting renewable community &small household systems. MRRD rural enterprise development program is also supporting small renewable power systems.

b. Shrink commercial losses by **building DABS capacity** through enhanced policies, systems, manuals, training etc., so it can be more effective addressing 'leakages' i.e. strong action on billings, collections and 'theft'.

***Improving <u>Future</u> Similar Projects in the ESA***

Electricity can radically **transform** people's lives and livelihoods as it not only improves standards of living and quality of life but also is a powerful force for **modernization and poverty reduction**. As was the case in Iraq, "where there is no light, there is no State', having the 'lights on' in Afghanistan is seen as a proxy for progress. Power certainly is not a panacea but electricity is key to tackling unemployment, poverty and illiteracy. A common refrain is that "people have a right to electricity'.

However, there are **<u>many strategic challenges</u>** involved with increasing electricity supply in the south of Afghanistan:

- It is vital for country's **development and stability** that electricity supply keeps up with demand. To promote economic growth it is necessary to ensure the provision of consistent, affordable power. Not just **more electricity** but also **targeted power** directed, for example, at wealth-creating commercial activities such as markets, bazaars and business parks, as well for farmers irrigation schemes. Many entrepreneurs who started and/or expanded enterprises during 2003-05 as power supply improved were forced to close plants down subsequently with ensuing job losses and deep resentment as the electricity supply situation deteriorated. Once restored, affordable and reliable public electricity will boost economic development[21].
- It is very expensive and difficult if not impossible to develop and maintain energy infrastructure in a **conflict** situation – security is therefore vital. When asked if people were better or worse off now, respondents did not compare the circumstance today to the late 1990s Taliban days but to the 'glory days' of 2003-05 when the situation was far more positive. People are increasingly disillusioned with IROA and ISAF, and fearful of Taliban. Low income residents are resentful that sparse cash must be spent on diesel and kerosene. It is vital that the Afghan government "deliver" public services to win public confidence, and the most important of these is electricity.
- However, a real dichotomy or **tension** exists between the short-term military counter-insurgency imperative to deliver on basic services such as electricity, in order to shift support from Taliban to IROA, and longer-term sustainable development. Diesel generators may offer a 'quick fix' solution but the cost of diesel fuel is exorbitant and supply routes highly vulnerable to disruption.
- The impact of adding power capacity and improving efficiencies will be advanced by strengthening the **legal, regulatory and institutional** environment governing the energy sector in Afghanistan. DABS is currently receiving extensive assistance from

[21] Kandahar Chamber of Commerce indicated the following factories would re-open - plastic sandals, fruit juices, dried fruit, furniture-making, formica, paper, plastic bags, cotton/corn oil. Also, by keeping supplies of fruits and vegetables for long periods, the cold storage facility would allow local agro-processing.

USAID and other donors to revamp its business systems and reduce commercial losses. USAID through the EGGI project is encouraging small private operators through IPP licensing and regulation. USAID is also encouraging energy conservation and efficiency through the Afghanistan Clean Energy Project.

- To reduce technical losses and enhance system capacity requires major long-term investment activity and this needs to be approached in a systematic, thoughtful and coherent fashion. An Afghanistan Energy Sector Strategy exists on paper but despite some communication and ad hoc sharing of information at the ICE forums, there is no real **coordination** and cooperation between donors[22] and Ministries regarding improving electricity supply. Instead of fragmentation[23] and short-term reactive action, a clear vision and long-term comprehensive energy **plan**, especially for the 'south', is urgently needed.
- Electricity is the only public service in Afghanistan that charges so a tariff structure that covers operating and capital costs would move DABS toward **financial sustainability**[24]. Funds are essential to invest in necessary upgrading and expansion of energy infrastructure. The consumer price for public electricity at the moment is too low and creates demand and encourages waste. Incremental price rises are in order but without placing a heavy burden on poor people and farmers and fomenting social unrest. Targeted subsidies can help keep prices equitable and affordable. IROA needs to move away from DPPs and the diesel fuel subsidy as quickly as possible.
- Energy initiatives also contribute to **poverty reduction** as operating efficiencies release public funds for social programs, end-user efficiency releases consumer income for alternate expenditures, improved sector governance better targets subsidies, and electrification facilitates income generating activities for the poor.

  Finally, as hundreds of millions of dollars may be committed soon by USAID and other donors in major SEPS upgrade and expansion, the data contained within this report will serve as a useful **baseline** for future impact studies.

[22] USAID, CIDA, DfID and ADB are engaged in energy projects in the south while GTZ/KfW, World Bank and JICA support energy initiatives elsewhere in the country where the security threat is more manageable.
[23] An example of donors acting alone is the recent DfID rural energy strategy.
[24] IROA aims to keep tariffs equal nationwide while at the same time move DABS to break-even in 2014.

# 2.0 INTRODUCTION

**Photo 1: Kajaki Reservoir**

The long Helmand River rises in the central Hindu Kush, crosses the southwest of Afghanistan, and ends in Iran. It is used extensively for irrigation and agriculture.

Kajaki Dam in the north of Helmand Province was built with US government funds in 1953 [1332] to facilitate irrigation and flood control in the Helmand River Valley[25]. The resulting Kajaki Lake is one of the most important reservoirs in Afghanistan.

In the mid-1970s the USG installed a hydropower power plant [HPP] at the Dam site[26].

**Photo 2: Kajaki Dam Wall and Hydro Power Plant**

[25] The Helmand River drains a catchment area of 47,300 km2 at the Kajaki Dam site from snow melt.
[26] Phase one envisaged 3 generating units of 16.5-18MW capacity each, and a 2nd phase of 4 units of 25MW each for a total of 150MW – see Kajaki Power Project Feasibility Study Mar 1977 p. 3.

The Kajaki HPP currently features two generating units and an ungated spillway – see below.

**Photo 3: Kajaki Dam Turbine and Ungated Spillway**

During the 1980s and 1990s, hydroelectric production dropped off almost completely as turbines were destroyed in conflicts, floodgates blown open, and transmission lines brought down. By the mid-1990s diesel generators were ubiquitous. After 30 years of operation, the two turbines at Kajaki Hydro Power Plant were rapidly aging and in serious neglect.

During 2003-2009, USAID rehabilitated Kajaki HPP and in addition created new energy capacity in Kandahar and Helmand to triple power generated to 51MW. Specifically, USAID established a diesel power plant [DPP] in Kandahar - 19 diesel generators were installed of which 5 were to help meet peak demand as well back-up when Kajaki HPP is disrupted.

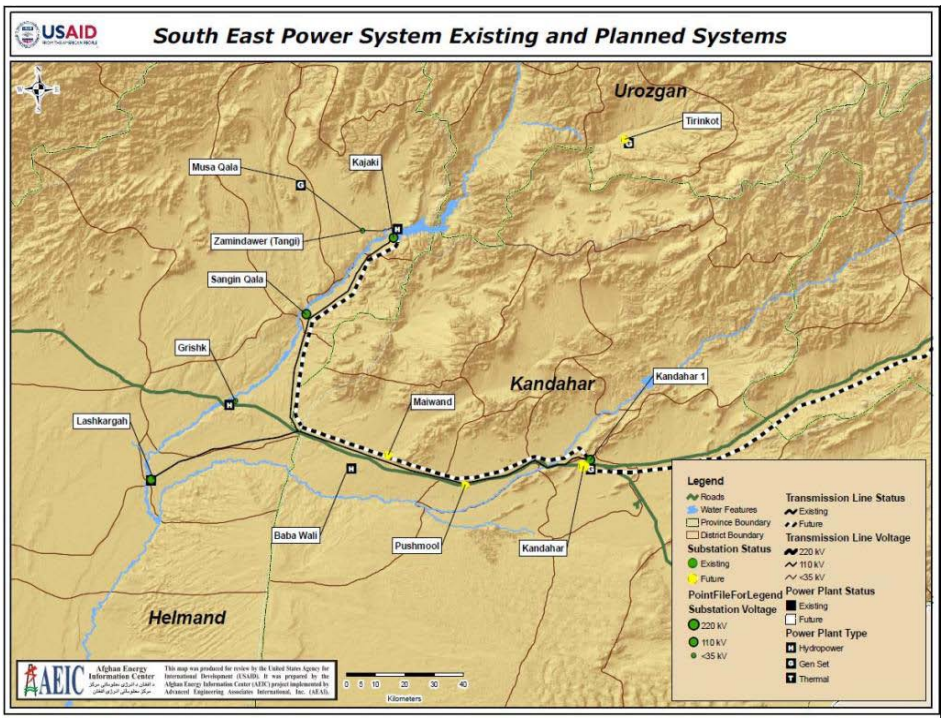
**Photo 4: Kandahar DPP and Back-up Generators**

USAID also established a DPP in Lashkar Gah - 3 diesel generators were installed to further increase power supply – and installed a sub-station in L-G to improve local distribution.

**Photo 5: Lashkar Gah DPP and Sub-Station**[27]

The aim of these improvements in electricity supply within this Electricity Supply Area or ESA[28] was to improve the quality of life for the one million residents of Kandahar City, and districts of Kajaki [including Tangi villages][29], Musa Qala, Sangin and Lashkar Gah.

**Map 1:Electrical Supply Area**




According to the Scope of Work [see Annex A], the purpose or goal of this assignment is to obtain a systematic assessment of social and economic impacts of the electrical supply improvements in the ESA described previously**.**

[27] During the field visit one L-G generator was under repair at DABS in Kandahar.

[28] The ESA is the South East Power System/SEPS that is separate from the national grid/NEPS.

[29] Tangi is the commercial centre of Kajaki District.

Through this study, USAID wishes to receive feedback from all groups of intended beneficiaries such as local residents, farmers, shopkeepers, businessmen, industrialists, law enforcement officers, senior government officials, community leaders, health practitioners, school administrators, PRT representatives, NGOs and politicians as to how their lives and/or livelihoods have been affected by enhanced access to on-grid electricity.

In line with the SOW and the broad objective, **specific objectives** of the study are as follows:

1. Assess the **differences in available power supply** in the ESA from 2003-09 i.e. improved on-grid electricity operating capacity and distribution due to a] upgrading of Kajaki Hydro Power Plant b] installation of diesel power plant [diesel generator sets] and c] sub-station;
2. Assess the **impact of on-grid electrification** in the ESA i.e. determine the effects of enhanced access to on-grid electricity on the local population with respect to: human development [such as income & employment, standard of living, poverty reduction and gender equality]; irrigation and agriculture; industrial development and commercial activities; water, health & hygiene, and sanitation; public services especially health and education; social; and protective security;
3. Assess the perception of the stakeholders[30] and beneficiaries on **continuing problems and constraints in electricity supply** within the ESA;
4. Make **recommendations** a] on improving existing **electrification in the ESA**, and b] on ways in which similar **future projects** may be improved upon i.e. lessons learned.

Key **indicators** for this study include electrical power supply and consumption, usage of electricity, changes in routine household functioning, business expansion and start-ups, agricultural practices, health facilities operations, education & learning, crime and security.

Checchi Consulting through its SUPPORT project was tasked with carrying out this socio-economic assessment study and a **study team** comprising Dr. Mafizul Islam, Team Leader and Mr. Denis Dunn, Socio-Economist was assigned to this project.

This Final Report is **structured** as follows:

- **Executive Summary** outlines key findings, conclusions and recommendations.
- **Introduction** discusses the study origins, purpose and objectives, and the structure of this report.
- **Background** presents the context for the study - an overview of the energy sector in Afghanistan, and especially issues surrounding the electricity situation in the Electrical Supply Area as well as a profile of the study area Districts.

[30] Defined as persons or organizations having a significant involvement with energy/power in Afghanistan.

- **Approaches and Methodologies** describes the overall approach taken by study, and specifically the survey design, enumeration process, and statistical techniques.
- **Findings and Analysis** presents key observations based on in-depth analysis of the quantitative and qualitative data and information gathered.
- **Conclusions and Recommendations** states **s**pecific recommendations addressing all concerns and/or problems identified through the field research, with a focus on suggestions for improving the existing electrification in the ESA, and ways in which the design of future similar projects may be improved.

# 3.0 BACKGROUND

## 3.1 Afghanistan Energy Sector

### *3.1.1 Energy Sector Issues*

This section of the report presents a brief overview of the energy sector in Afghanistan, and especially the electricity supply and demand situation in the Electrical Supply Area or ESA[31]. This background information provided will help contextuate the findings, conclusion and recommendations of the study.

The Afghanistan National Development Strategy [ANDS] is structured around Security, Governance, Infrastructure & Natural Resources, Education and Culture, Health & Nutrition, Agriculture & Rural Development, Social Protection, and Economic Governance & Private Sector Development. In addition, there are cross-cutting issues of capacity-building, gender equity, counter narcotics, regional cooperation, anti-corruption and environment.

Under pillar 3 - Infrastructure and Natural Resources - there are energy, transportation, water, ICT, urban development and mining components. Regarding the energy sector, the demand for energy has always exceeded supply in Afghanistan, even in traditional energy, and per capita consumption of electricity in Afghanistan is one of the lowest in the world. The vast majority of Afghanis are not connected to the two sub-national grids – SEPS and NEPS – and many, particularly in rural areas, must rely instead on expensive diesel generators for electricity as opposed to low cost power from hydroelectric dams or imports.

Currently, there are four Afghan Ministries with major responsibilities in the energy sector – Energy & Water, Mines, Rural Rehabilitation & Development, and Commerce & Industries. The MEW has the mandate for on-grid electricity[32] and decides on grid extension while MRRD has the mandate for off-grid solutions that are typically renewable in nature.

Development of energy in Afghanistan is currently hampered by poor infrastructure, insufficient financing, lack of trained personnel and weak government policies. These constraints are compounded by the state electrical utility whose revenues do not cover operating expenses, let alone capital costs, due to a failure to properly bill and collect from consumers[33]. So-called 'free-riding' is ubiquitous throughout the country.

[31] Information in this section is in large part derived from the Afghanistan Energy Sector Strategy Feb. 2008
[32] In practice, MEW gets involved in any power project generating more than 200kw.
[33] The USAID Afghanistan Clean Energy Project [ACEP] states that only half of the 550,000 connections to Kabul Electricity Department have an account and pay bills – cited in an RfP Jan 2010.

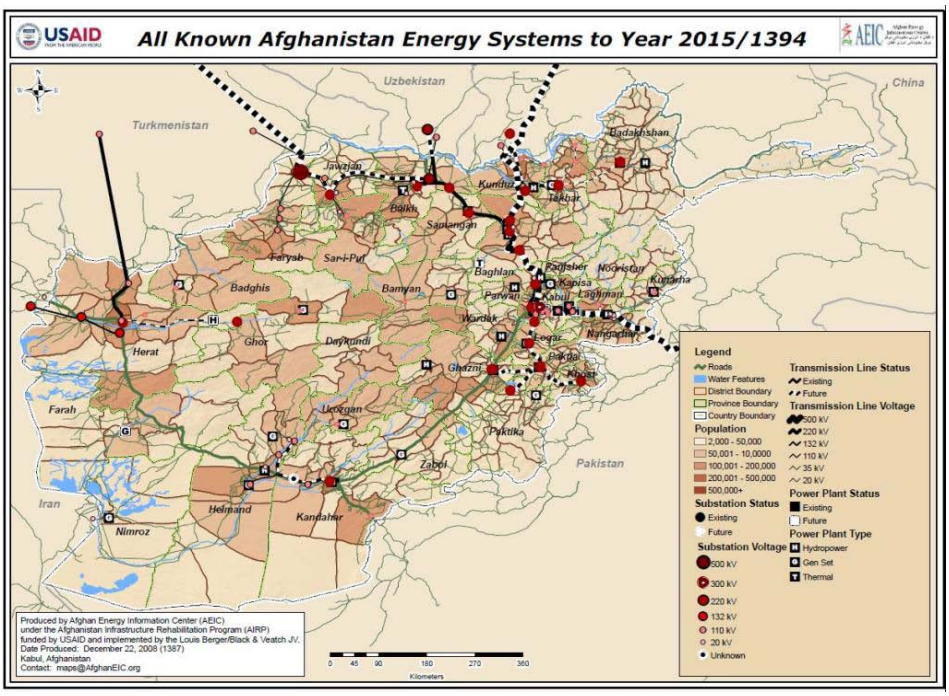
Residential users of power pay 3.8 Afs/kwh but this is well below the average cost of production. The marginal cost of diesel is US 30 cents per kwh[34] and very expensive when compared to hydro [2.3 cents], imported power [2.6 cents] and natural gas [2.8 to 3.5 cents][35].

In addition, it is expensive to connect each new customer to the grid costing up to $1,000 in distribution costs, although the actual connection fee is only a flat USD22 country-wide. It may be far cheaper to provide decentralized systems outside the major urban centers. GTZ is testing a 'bottom-up' approach involving establishing mini-grids in remote areas in the north that eventually may link to the main grid. Population density and distance to the main grid are the main determining factors on grid extension decisions.

Apart from the huge up-front capital cost, centralized power systems can result in up to two-thirds of energy generated being lost before it reaches the end-user. DABS Kandahar claim the system loss is 20% in SEPS but others suggest it is much higher due to aging infrastructure, theft and sabotage.

The Energy System in Afghanistan shows two sub-national grids – the SEPS and the NEPS. This impact study is concerned with the SEPS in the south.

**Map 2: Afghanistan SEPS and NEPS**




Flat rate charges for electricity use are criticized as it provides no incentive to cut back on consumption. Prepaid meters are preferred over credit as it affords the resident more

[34] Excluding other diesel-related expenses such as maintenance, repairs, labor/operator and depreciation – a generator's economic life can extend to 20 years with proper care and attention but as little as 18m without.
[35] Energy Sector Strategy 2007/8 – 2012/13 Pillar 3 Infrastructure, ANDS, IROA Feb. 2008

control over consumption. In addition, prepaid cards sold through a retail network [pay points similar to cell phones] address the problem of collections and corruption.

### *3.1.2 Renewable Energy*

Although Afghanistan contains significant indigenous fossil fuels especially natural gas and coal [IROA Energy Sector Strategy], it also has considerable potential for 'clean energy' - hydropower mega projects[36] as well as wind, micro-hydro, geothermal, biomass [fuel wood and crop residues] and solar. Off-grid renewable technologies are especially pertinent for rural and remote parts of the country. Some renewable initiatives use a mini-grid system with connections up to 15 kms from the generation source with a view to joining the main grid at a later date. Renewables tend to have a longer economic life than fossil fueled power, negligible emissions and less operating expenses.

Rural energy options tend to center on off-grid solutions meaning renewable technologies. In Afghanistan, generally speaking the renewable energy potential is for micro-hydro in the north, wind in the west and north, and solar in south and east where there is ample sunshine.

There are currently 30 micro-hydro projects in the north up ranging to 100kw in size. Usually, a charge has to be made to each household ranging from 150-200 afs per month to pay for an operator. Hydro power is the preferred solution as it is available 24 hours and is the cheapest form of energy.

There are plans to build a wind 'farm' near Herat. Some windmill components are manufactured in the country. Wind turbines can be as small as 1kw.

Solar Home Systems [SHS] are becoming popular and consists of a few panels and [up to 8] batteries for back-up that are all imported. A good quality system costs $500-600 to install comprising panels from Japan, controls from Germany and 'high end' batteries. Maintenance requirements are low and batteries can last up to 3 years with about 1,000 charges/discharges. Donors currently provide 90% of the capital costs and the community contributing 10%. 500 watts per day is sufficient for a couple of light bulbs and a small fan. Passive solar techniques are not yet evident such as black tanks installed on rooftops for heating water.

For $5 million it is possible to install 4,000 solar home systems impacting 25,000 people, – a quick fix short-term solution. Another option is a $2-3 million solar system community-level 'local utility' managed and owned by the CDC with 350 meter points and impacting about 4,000 people.

Biogas projects such as anaerobic digesters tend to be sporadic, very small and traditional i.e. using cattle dung as fuel for cooking purposes and to substitute word and charcoal.

There are no renewable projects in the 'south' at present due to the security situation with the exception in Kandahar of pilot solar street lights and solar lanterns with a life of 3-5

[36] Worldwide, there is an installed capacity of 777 GW of hydroelectricity generating approximately 20% of the world's electricity, and accounts for 88% of electricity from renewable sources [Wikipedia 24/6/10].

years. Some consideration is being given to installing a 10MW solar plant outside Kandahar costing up to $75 million.

To date, there is no private investment in renewable energy projects. By contrast, in some urban centers, private enterprise is flourishing with respect to small diesel generators and connections to households within a neighborhood but this activity is undocumented.

### *3.1.3 Energy Strategy*

The greatest concerns at the community level - the CDCs[37] - tend to be consistent: roads, water and power. Other surveys find that Afghanistan citizens rank security, employment and electricity among their highest priorities. Bottom line – access to electricity is viewed by households as a basic need - primarily for lighting [encourage evening study by children], a small fan, some refrigeration and then for productive or income generation activities such as farm water pumps[38], cold storage, agro-processing [e.g. bakeries] or welding. Depending on income, residents may then acquire TV and even satellite dish, and appliances. For local clinics, electricity can mean refrigeration of drugs, and operation of small equipment, and for schools lighting, fans and a couple of computers.

Electrification is not only essential for long-term economic growth. Providing electricity also strengthens the legitimacy of the Afghani government and contributes to stabilization. Building confidence in government's ability to deliver public services lessens support for the Taliban insurgency. The prevailing counter-insurgency strategy[39] states that the best prospects for stabilizing Afghanistan is to push the militants out of major cities and towns in the strategically south, and build up effective local governance as well as an enabling environment for establishing and expanding businesses and creating jobs. Because of the timeline for troop withdrawal and declining public support for war in NATO countries, there is an imperative for activities with quick impact on the local population.

As such, diesel generators are strongly promoted, especially in Industrial Parks to create jobs and incomes. However, due to their high operational and maintenance costs, they are not a sustainable solution but there appears to be no other realistic option during the transition period from stability to long-term development.

[37] A typical CDC comprises 100-200 households.

[38] One reason why small farmers prefer to grow poppies is that they require little water so presumably with pump irrigation and sprinklers could consider other crop options.

[39] During the field trip, a senior PRT official stated that "it is all about COIN in the south".

**Photo 6: Diesel Storage in Kandahar**

According to the Afghanistan Energy Sector Strategy 2007/8-2012/13, continuing to operate on a 'business-as-usual' basis is unsustainable. Since 2001, Afghanistan energy efforts have focused on 'bailing the boat' or 'keeping the lights on' but what is needed is a long-term sustainable strategy for energy.

The new Strategy calls for development efforts in the energy sector to focus on:

- Greater **operating efficiency** in terms of:
  - commercialization of DABM[40];
  - investments in transmission and distribution to reduce system losses;
  - repair and maintenance of all power assets to prolong life.
- more **efficient energy use** through conservation[41].
- enhancing the **enabling environment** [policy, legal and regulatory frameworks].

The new strategy also calls for electricity to be given greater emphasis due to its modernizing impacts. Electricity turns on economic development not just lights – cold storage for farmers, electric water pumps for irrigation and affordable power for small productive units.

With the assistance of the donor community[42], IROA will provide energy to those that can best use and pay for it, in the quantities and quality needed, at a price that covers cost and in a cost-effective manner. IROA has already taken steps to transition the energy sector away from Government toward private sector provision by setting up semi-private DABS.

Recently, international donors have focused on expanding the availability of energy resources nationwide with an emphasis on supply of natural gas, hydro-electric

[40] The Afghan electric utility DABM has outsourced billing and collection to DABS

[41] USAID-funded ACEP is tasked with 'saving' 50MW through energy efficiency [eliminate losses and leakages].

[42] Major donors in Afghanistan energy are World Bank, ADB, GTZ, DfID, DANIDA, CIDA, JICA and the USA.

generation, rehabilitate transmission and distribution system, basic services in rural areas and remote areas through development of renewable energy resources[43], low-cost power imports and building capability of energy sector institutions – for example the Inter-Ministerial Commission for Energy [ICE] that was established in 2006.

USAID is committed to improving and expanding Afghanistan's infrastructure 'backbone'. With respect to energy, it is building the capacity of a sustainable national utility [DABS] to better manage the sector by: increasing power generation capacity; developing domestic energy resources; controlling power transmission networks; increasing connections; and improving revenue collection.

USAID sees enhanced supply of energy infrastructure reducing costs for farms and industries thereby positively impacting productivity, creating new markets and attracting investment.

The challenge in developing energy assets in the 'south' is that efforts encounter war-like security conditions[44], as well as physically remote and inaccessible sites. It is very difficult to balance international best practice development approaches with the requirements of an ongoing military campaign.

The Afghan Energy Strategy is also a poverty reduction strategy: operating efficiencies will release public resources for social programming and end-user efficiency will release consumer income for alternate expenditures; improved sector governance will better target subsidies; rural electrification will facilitate income generating activities for the rural poor; and economic growth will in general 'be a rising tide that lifts all boats'.

The remainder of this section briefly profiles the Kandahar City/District and Lashkar Gah City [plus Musa Qala, Sangin and Kajaki Districts] in terms of demographics, economy, education, health, agriculture and security, and then provides an overview of the energy situation in the five study districts.

## 3.2 Kandahar

### *3.2.1 Kandahar Overview* [45]

**Land Area**

Kandahar Province is located in the South of the country and is bordered by Helmand, Zabul, and Urozgan provinces, and also borders Pakistan in the south. The land area of the Province is 54,844 $km^2$ and represents 8.4% of Afghanistan with 19 persons/ $km^2$. The provincial center is Kandahar City.

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[43] 'clean energy' solutions such as micro-hydro, wind and solar will help put Afghanistan on a lower carbon development trajectory.

[44] A recent UN report noted substantial increase in violence in Afghanistan due to 'anti-government forces' that was especially pronounced in the 'south'.

[45] Information summarized here is in large part taken from Socio-Economic Demographic Profiles of Helmand and Kandahar provinces prepared by the Central Statistics Office and UNFPA in 2005 and updated by Statistic Year Book prepared by Central Statistics Organization of Afghanistan, and the MRRD Provincial Profiles 2007.

**Demographics**

The 2009-10 population of Kandahar Province is 1,057,500[46] with about two third of the province living in rural areas. Kandahar City is regarded as the district center of Kandahar and contains 468,200 persons. Population is increasing about 2.06% annually. The male: female ratio is 51:49. There are 15 Districts in Kandahar Province and 81% of the population lives in 6 of them. Three districts have a high population density - Kandahar City with 926 persons per $km^2$, Spin Boldak with 113 and Panjwai with 88. Pashtu is spoken by 96.5% of the population in Kandahar Province. In Kandahar city, Pashtu is spoken by 70% of the population, Dari by 20% and 10% of other minority languages. Average family size is 6.52.

**Economy**

The economy of Kandahar City is based primarily on trade and services, non-farm labor, and peri-urban agriculture. The 2005 Profile describes economic activity in terms of 8 categories:

- Subsistence crops – wheat, corn, rice, maize, beans, peas
- Industrial crops – cotton, sugar, sesame, tobacco, olives
- Fruits - grapes, pomegranates, apricots, watermelon, orange, almonds, walnuts, mulberry
- Vegetables – potato, onion, tomatoes, carrots, cauliflower, spinach, leek
- Herbs – licorice, aniseed, chicory
- Handicrafts – carpets, rugs, embroidery, pottery, jewelry, shawls
- Small industry – honey, silk, sweets, textile, potato chips, fruit juice, dried fruits
- Animal products – eggs, milk yoghurt, butter, wool, silk

In 2005 there were 3,127 factories and workshops of which 3,072 were workshops – about one per 292 population. The vast majority [2,579] of these factories and workshops were in Kandahar City. The small workshops comprise mechanical repair shops [bicycles, motorcycles, radio, TV, cookers]; electrical repair workshops [fridges, fans, electric appliances], workshops for juice making, ice-making, making plastic shoes and sandals, fruit processing, bakeries [452] and mills [313].

There were over 900 hotels and restaurants in Kandahar Province in 2005, and many barbers and beauty salons. The retail sector encompasses food and grocery stores, clothes & textiles and construction materials enterprises. In 2005 there were 3,281 mosques in Kandahar province – about one per 278 persons, as well as numerous small poultry and livestock farms.

Since 2005, over 100 businesses have closed down according to the Kandahar Chamber of Commerce due to the increasing unavailability of public electricity, and 12,000 jobs lost. The Kandahar Industrial Park is essentially a 'ghost town'.

[46] See footnote 26 – such statistics are imprecise as there has not been an official census for decades.

**Photo 7: Deserted Kandahar Industrial Park and Idle Manufacturing Tenant**

On the bright side, the area is renowned for precious gemstones and minerals such as marble[47]. The cold storage facility in Kandahar is operational but relies on expensive generators to survive.

**Photo 8: Kandahar Cold Storage Facility and Imported Eggs from India**

## Education

Kandahar had 229 primary schools with 123,581 students in 2008-09,76 secondary schools with 22,411 students and 35 high schools with 4,591 students. Primary school attendance is 39% among school-age children. The student-teacher ratio is 51:1. The educational system is lacking in qualified teachers, school buildings/classrooms, materials and equipment. School transportation is also a constraint. The literacy rate is low 14%. The number of total students in Kandahar Province is 150,583 (17% female) and the total number of teachers is 2,931 (12% female).

## Health

[47] A recent USG study estimates the value of untapped mineral deposits in Afghanistan - iron, copper, cobalt, gold and critical industrial metals like lithium - to exceed one trillion dollars.

In 2008-09, there were 16 outpatient facilities in Kandahar City, as well as 102 doctors, 300 nurses and 2 hospitals with 391 beds. There are 359 pharmacies of which only one of which is government owned and the rest belongs to the private sector.

Health facilities need electricity for fridges [storing drugs and medicines], operating rooms – surgical procedures, fans in summer, lights, computers, and heating water. Load-shedding is big problem for them - in Kandahar, health facilities only get grid electricity 50% days, and on allocated days 50% time[48]. All hospitals and clinics have back-up generators but cannot afford the cost of diesel. Outside of the City, there is no grid electricity.

In addition to power, security poses big challenge outside of City, as well as hiring women to work in health centers, clinics and hospitals. Residents have limited access to basic health care – there is a shortage of medicines, vaccinations, facilities including maternity wards, examination units, laboratories, health personnel, medical supplies and equipment.

**Photo 9: District Hospital Generator and Idle X-Ray Machine**

Although private hospitals are thriving, Kandahar needs more public health facilities[49].

## Agriculture

Outside of Kandahar City the hinterland features extensive agriculture and livestock. Locally grown major fruits include grapes, apples, pomegranates, almonds and apricots. The three major crops grown are wheat, cotton and corn/maize. Together, these three crops account for approximately nine out of every 10 villages engaged in production of subsistent crops.

The food industry includes processing of dried fruit, fruit juice, and potato chips. There are ample grazing lands and water reservoirs but some irrigation systems are destroyed due to conflict or not utilized due to extended drought. Problems include lack of irrigation

[48] According to health officials in Kandahar during the field visit meeting.

[49] The Afghan health system is structured in terms of basic health centres [BHC], comprehensive health centres [CHC], district hospitals [DH] and regional hospitals [RH].

systems, high yield seeds, chemical, fertilizers, veterinary clinics, and mechanical equipment [modern agricultural technology].

**Infrastructure**

Outside of Kandahar City the road system and public transportation is wholly inadequate, and telecommunications is limited in most districts. 85% of households in Kandahar have access to grid electricity though much of this is illicit.

**Security**

A recent UN study notes a deteriorating security situation in the 'south' over the last 3 months and the long-expected military campaign – the so-called 'creeping surge' – has been delayed until the Fall.

### *3.2.2 Kandahar Energy* [50]

**Current Energy Demand**

DABS Kandahar informs that the existing customer base in Kandahar City is 44,980 of which 87.3% connections are residential, 11.08% are market/commercial and the remaining 1.65% are religious, government and factories. In March 2004 there were 21,609 customers so connections have more than doubled in 6 years.

The table below shows the current energy requirements of the existing customer base in Kandahar. The demand varies from 40-50MW:

**Table 1: Kandahar City Energy Demand**

| seasons | | May-Sept | Apr and Oct | Mar & Nov | Dec-Feb |
|---|---|---|---|---|---|
| **Total monthly energy needs MWH** | | 701,030 | 621,371 | 734,375 | 808,939 |
| **Total MW peak** | | **43** | **37** | **42** | **48** |

In terms of demand in the near future, calculations must consider natural growth as well as emergent and suppressed customer base[51]. DABS estimates over the next five years the peak demand in Kandahar City to rise 65 MW.

**Current Energy Supply**

There are four sources of grid connected electric generation serving Kandahar City at present – see table below for power capacity.

[50] The information summarized here is in large part taken from two recent unpublished baseline studies [Provincial Profiles] by The Louis Berger Group, Inc. and Black & Veatch Special Projects Corp. Joint Venture and verified and updated through DABS sources in Kandahar and Lashkar-Gah.

[51] Emergent are potential customers who want power but do not have it, while suppressed are those customers who want additional power but cannot get any due to limitations of supply/energy infrastructure.

**Table 2: Kandahar Electric Grid Supply - Power Capacity**

| Generation Source | Nameplate capacity | Operating Capacity | Constraints |
|---|---|---|---|
| Kajaki HPP [serves Helmand & Kandahar Provinces] | 34.5 MW | 28-30 MW [10-12 to Kandahar City at peak] | 110kv SEPS transmission line limits power to Kandahar and Lashkar Gah to 19-21 MW |
| KTA-50 Diesel Power Plant DPP | 11.9 MW [14 gensets x 0.85] | 7-9 MW | Only 11 units operating, and at 80% capacity due to age |
| QSK – 60 DPP | 8.8 MW [5 gensets x 1.76] | 6-7 MW | 5 units operating - used at peak unless Kajaki HPP is disrupted |
| Baba Wali micro-hydro | 250 KVA | 250kw | Only for 6 months each year |
| **Total Electric Supply at Peak** | | **25 MW** | |

Power generated and available [received by consumers] is adversely affected by: DPP de-rating; fluctuating water levels in Kajaki Dam; theft, and Kajaki to Kandahar transmission line faults and outages due to sabotage[52]. The system loss ranges from 35-50%.

The table below shows average daily power produced and received in Kandahar:

**Table 3: Kandahar Electric Grid Supply – Power Produced and Received[53]**

| Generation source | Ave. daily production MWh | Energy received Kandahar MWh |
|---|---|---|
| KTA 50 DPP | 122 | 122 |
| QSK 60 DPP | 75 | 75 |
| Kajaki Unti 1 | 223.4 | 95.74 |
| Kajaki Unit 3 | 238.4 | 102.17 |
| **TOTAL** | **592.2** | **328.31** |

The Kandahar energy baseline study also indicated that the National Solidarity Program has established various solar and small diesel projects, presumably in the rural parts of Kandahar Province. They provide 56 KW and 2,520 (63 KW/unit Average), and serve 2,795 families and 9,718 families respectively.[54]

In 2006 only 27% of Kandahar Province had access to grid electricity. It is not known how much of the Province is served by diesel gensets - certainly many government departments, businesses, hospitals and schools use them and there is a thriving local industry in repair and maintenance.

[52] During the Kandahar field visit, one informant indicated that the authorities would retaliate by blocking power to Kajaki/Sangin/MusaQala Districts but of course this could not be validated.
[53] This information is largely taken from DABS and Afghan Energy Information Center (AEIC).
[54] This information is provided by NSP.

**Photo 10: Diesel generators are prevalent throughout the south**

## Energy System Supply-Demand Balance

The table below shows Kandahar City electric grid shortfall:

**Table 4: Kandahar City Energy Shortfall**[55]

| | Peak supply | Peak demand | Current shortage |
|---|---|---|---|
| **Generation MW** | 25 | 48 | **23 MW** |
| **Energy daily MWh** | 328 | 808 | **480 MWh** |

## Kandahar Energy Revenues

In Kandahar there is a sliding scale regarding tariffs – residential 0-300kwh 1.5 afs per kwh, 300-700 it is 4 afs, over 700 kwh it is 6 afs. Industries [market stalls, workshops, government] pay 6 afs per kwh if they are registered and 10 afs if they are not.

With 45,000 connections/users in Kandahar City, averaging afs 225 each per month [500 afs in Kabul] equals approx. USD50 annually or about $2.4 million. DABS revenue figures confirm this amount.

DABS report that 80-85% of Kandahar consumers are paying their bills accordingly.

## Kandahar Energy Costs

According to DABS, 900,000 liters of diesel are used per month assuming both DPP stations are operational. With diesel costing about one $, that is a total for the year of $ 7 to 9 million.

[55] Ibid. p. 4

## 3.3 Lashkar Gah

### *3.3.1 Lashkar Gah Overview*

**Land Area**

Helmand Province is located in the SW of the country and is bordered by Daikundy, Urozgan, Ghor, Kandahar, Nimroz and Farah Provinces. Helmand also borders Pakistan in the south. The land area of the Province is 58,305 km2 and represent 8.93% of Afghanistan. There are 12 Districts and the provincial center is Lashkar Gah.

**Demographics**

The 2009 population of Helmand is estimated at 821,800 with almost 95% living in rural areas with the urban population concentrated in L-G. Half of the population live within 22 kms of their respective District Centre. The study area is focused on the Provincial center Lashkar Gah, and the districts of Kajaki [incl Tangi village], Musa Qala and Sangin. Lashkar Gah has 201,546 inhabitants, Kajaki has 119,023, Sangin has 66,901and Musa Qala has 138,896[56].

The fertility rate is high – a typical household in Helmand has 6.64 persons which is higher than the national average of 6.3. Pashtu is spoken by 92% of the people in Helmand.

**Education**

In 2008-09, Helmand had 173 primary schools with 107,102 students [in 101 of 1,705 villages], 72 secondary schools with 17,438 students and 26 high schools with 3509 students Females consisted 12% of total students. Most districts lack qualified teachers, school buildings/classrooms, materials and equipment. School transportation is also a constraint. The literacy rate is lower than 10% in the province. Schools are for the most part closed in the 3 rural Districts of Musa Qala, Sangin and Kajaki.

**Health**

In 2008-09, Helmand has 14 health care facilities [4 district hospitals and 117 clinics], 55 doctors , 167 nurses, 3 hospitals containing 185 beds, and 309 private pharmacies [451 in 2005] and no government pharmacies.

Residents have limited access to basic health care – there is an acute shortage of medicines, vaccinations, facilities including maternity wards, examination units, laboratories, health personnel, essential medical supplies and equipment. There is also a weak emergency response and lack of public health awareness. A private hospital exists in Musa Qala.

[56] Taken from MRRD Provincial Profile 2007.

## Economy

Helmand's economy is primarily based on agriculture and livestock, opium and trade and service. The economic base is similar to Kandahar.

In 2005 there were 3,194 factories and workshops of which 1,034 in L-G – mostly small workshops. They comprise mechanical repair shops [bicycles, motorcycles, radio, TV, cookers]; electrical repair workshops [fridges, fans, electric appliances], workshops for juice making, ice-making, making plastic shoes and sandals, fruit processing, bakeries [252] and mills [1,160].

There were over 600 hotels and restaurants in Helmand in 2005, and many barbers and beauty salons. The retail sector encompassed food and grocery stores [8,270], clothes & textiles [2,268] of which 496 in L-G], and construction materials 547. In addition, there were 5,385 mosques – about one per 268 persons. There were also numerous small poultry and livestock farms.

There are mineral deposits in the Province such as salt, iron copper and uranium with some commercial operations ongoing. There is potential for handicrafts [rugs and jewelry], and food processing.

All districts in Helmand suffer from extreme poverty due to lack of employment opportunities that in turn is a result of a weak local economy, declining incomes and output in agriculture and livestock, and compounded by insecurity and negligible public services.

## Agriculture

Agriculture and livestock is active but production levels are low and incomes poor. In Helmand there is agriculture crop production [wheat, corn, maize, watermelons, fruit/nuts, grapes]; animal products such as skin and honey; agro-processing tobacco, sugar and sesame.

There are ample grazing lands and water reservoirs but some irrigation systems destroyed or damaged due to conflict, and not utilized due to an extended drought. Other problems include lack of irrigation systems, high yield seeds, chemical, fertilizers, veterinary clinics, and mechanical equipment [modern agricultural technology].

**Photo 11: Fertile Helmand Valley**

In the 3 rural Districts of Sangin, Musa Qala and Kajaki, much of the electricity is used for agricultural purposes such as water pumps and drilling deep wells for irrigation, as well as for agro-processing e.g. milling. There is no industrial production in north Helmand.

**Infrastructure**

The Province lacks basic infrastructure such as telecommunications, roads, bridges, culverts and public transportation – much of which was destroyed/damaged by war. 21% of households in Helmand had access to electricity in 2007 and 2/3 of these from public electricity. In Sangin/Kajaki/Musa Qala Districts there are no street lights.

Irrigation systems such as canals, dykes and reservoirs, and flood protection walls are mostly destroyed or damaged. Due to war, Kajaki infrastructure does not facilitate commerce. Inhabitants lack affordable public electricity.

**Security**

In terms of security, Helmand is probably the most unstable and volatile Province in the country.

### *3.3.2 Lashkar Gah Energy*

**Current Energy Demand**

DABS Lashkar Gah indicate the existing connections in Helmand study areas is around 40,000 of which 10,515 are in Lashkar Gah City [9,044 residential, 1,327 commercial, 132 governmental and 12 factories], and about 10,000 in each of Kajaki, Sangin and Musa Qala. The northern districts figures are a very rough estimate as for the last 5 years the area has been under Taliban control. The customer base breakdown in Lashkar Gah City is similar to Kandahar i.e. 90% residential, 8% market/commercial and 2% religious, government and small-scale production.

In Lashkar Gah, there were only 5,596 connections in 2004 while in the 3 northern Helmand districts in 2007 [the only year figures available], Kajaki had 2,368 connections, Sangin had 6,135 and Musa Qala had 3,218. In short, it appears that the number of customers has more than doubled in 3-5 years.

DABS guesstimates that 20% of households are not connected to the grid but clarify that with the refugee situation in the 3 rural districts in the opposition-controlled north of Helmand Province it is impossible to verify.

The Helmand Baseline Study calculates peak demand for all customers within Lashkar Gah City [Helmand Centre] at 18.1MW, including 12.7MW peak demand from residential customers. A rough estimate of total energy future demand is 22MW by 2015 from existing, emergent and suppressed customers in Lashkar Gah.

**Table 5: Lashkar Gah City Energy Demand**

| *seasons* | | *May-Sept* | *Apr and Oct* | *Mar & Nov* | *Dec-Feb* |
|---|---|---|---|---|---|
| ***Total monthly energy needs MWH*** | | *701,030* | *621,371* | *734,375* | *808,939* |
| **Total MW peak** | | **15** | **13** | **14** | **18.1** |

## Current Energy Supply

There are at present 4 sources of grid connected electric generation serving Helmand Province - 2 diesel power plant and 2 hydro power plants. It could not be ascertained which populations are served by the 2 DPP and 2 HPP. The table below shows the power capacity of the DPPs and HPPs.

**Table 6: Helmand Grid Electricity Supply – Power Capacity**

| *Generation Source* | *Nameplate capacity* | *Operating Capacity* | *Constraints* |
|---|---|---|---|
| Kajaki HPP [serves Helmand & Kandahar Provinces] | 34.5 MW | 32 MW of which:<br>7 to Lashkar Gah<br>3 to Sangin<br>4 to Musa Qala<br>4 to Tangi<br>2 to Kajaki area<br>[12 to Kandahar City] | 110kv SEPS transmission line limits power to Kandahar and Lashkar Gah to 19-21 MW<br><br>Subject to insurgent activity [cut lines, destroy towers] |
| Grishk HPP | 2.4 MW | 1.2 MW | 1 turbine not operational DfID looking at fixing. Only serves Grishk |
| KTA-50 Diesel Power Plant DPP at Lashkar | 2.55 MW [3 gensets x 0.85 MW or 850kw] | 2.25 MW [750kw x 3] | No backup units. Only 2 operational – one under repair in Kandahar |
| KTA 50 G3 DPP at Musa Qala | 0.85 MW | 0.75 MW | 1 unit – no backup |
| **Total Electric Supply at Peak** | | **24 MW** | |

In addition, this operating capacity is adversely affected by: DPP de-rating; fluctuating water levels in Kajaki Dam; and Kajaki to Helmand transmission line faults and outages due to sabotage. The SEPS system losses are in the 35-50% range.

DABS Kandahar states that Tangi, the commercial center of Kajaki District, receives electricity 24/7, presumably because the area is under Taliban control and they tend to cut the power from Kajaki HPP going south to Kandahar and Lashkar Gah.

For Kajaki, Sangin and Musa Qala Districts at least 8MW is received continuous but due to demand is rotated around different areas. The table below shows average daily power produced and grid electricity received in Lashkar Gah City/District Centre:

**Table 7: Lashkar Gah Grid Electricity Supply – Power Produced and Received**

| Generation source | Ave. daily production MWh | Energy received Lashkar Gah City MWh |
|---|---|---|
| Kajaki Unit 1 | 130 | Unknown |
| Kajaki Unit 3 | 139 | Unknown |
| Lashkar-Gar gensets | 24.20 | 8815 |
| **TOTAL** | **n/a** | **n/a** |

The Helmand energy baseline study also indicated that the National Solidarity Program has established 162 small energy projects within Helmand Province comprising solar [127kw], micro hydro [100kw] and small diesel projects [3.5MW], presumably in the rural parts of the Province, with an estimated total capacity of 3.8 MW.

It is not known how much of Helmand Province is served by diesel gensets though they are widely used by government institutions, businesses, households etc.

**Energy System Supply-Demand Balance**

The table below shows Lashkar Gah City [Helmand Centre] grid electricity shortfall:

**Table 8: Lashkar Gah City Energy Shortfall**

| | Peak supply | Peak demand | Current shortage |
|---|---|---|---|
| **Generation MW** | 9.25MW | 18.1MW | **8.85MW** |
| **Energy MWh daily** | 120 MWh | 168MWh | **48MWh** |

The residents of the study districts within Helmand Province clearly lack access to reliable and affordable public electricity.

**Lashkar Gah Energy Revenues**

With about 10,500 connections/users in Lashkar Gah City, averaging Afs200 each per month equals approx. USD50 annually or about $550,000. DABS confirms this amount.

DABS claims the average consumption of electricity in the City is 450kwh in a month @ afs 1.5 = 675 afs. DABS indicates residents receive power 15 hours daily unless power disrupted from Kajaki HPP.

According to DABS in L-G, 1/3 of customers do not pay their bills.

Kajaki Dam staff confirmed that the Taliban collect payments from electricity consumers in the 3 rural districts of Sangin/Kajaki/Musa Qala, and in fact base charges on usage i.e. they read household meters. A rough estimation puts this revenue at USD 1 million annually[57].

[57] 30,000 connections in rural districts Kajiki/Sangin/MusaQala averaging 150 afs per month.

**Lashkar Gah Energy Costs**

The City of Lashkar Gah uses approx. 200,000 liters of diesel monthly costing about $2.4 million annually.

# 4.0 APPROACH AND METHODOLOGY

## 4.1 Phased Approach

The Study Team approached this assignment in several planned **phases** [see Annex B for Work Schedule]. The following 10-step process was followed by the Study Team:

1. preparing a detailed **workplan** for the assignment;
2. gathering and reviewing **background documents**, including USAID and other development partners reports and independent studies [see Annex D for List of Document Referenced] ;
3. drafting end-user **survey instruments [**Annex E**]** for various on-grid electrical consumers and off-grid beneficiaries in the ESA, and control groups; and encoder sheets in order to tabulate the data;
4. **scoping** the ESA and fielding **surveys of** end users – a local survey firm was engaged and closely supervised [see Annex F for the Request for Proposal]**;**
5. holding **consultation meetings with key stakeholders** in Kabul such as government officials [Energy, Health, Education, Rural Development and Agriculture] and development partners and donor project representatives [see Annex G for List of Persons Consulted];
6. arranging and conducting **field visits** [see Annex H for Field Visit Plan including 'key informants'] in order to:
    a. inspect key electrical supply assets such as Kajaki Dam [HPP and transmission line], diesel generating stations in Kandahar and Lashkar Gah, sub-station in Kandahar, various distribution and feeder lines, and consumer connections.
    b. Tour industrial parks and health facilities in Kandahar and Lashkar Gah
    c. Interviews with 'key informants' in the field such as the Governor and Ministry of Energy/DABS officials;
    d. focus group discussions with groups of 'key informants' e.g. local business owners and NGOs;
    e. meet SDLR Field Coordinator and Supervisors.
7. **analyzing** quantitative and qualitative data from primary and secondary source;
8. **drafting** report;
9. **disseminating** findings to stakeholders through a PowerPoint presentation [see Annex I];
10. **finalizing** and submitting final report.

For a more detailed understanding of operational activity, see Annex C Daily Task Record.

## 4.2 Field Survey Research

With respect to the approach for the field survey, the first step in designing an appropriate methodology is to formulate the study design followed by definition of impact indicators. In the process, the study team had meetings with the USAID Afghanistan's Office of Infrastructure, Engineering and Energy (OIEE) staff and reached a consensus on all key issues [for a more detailed description of primary research approach and methodology see Annex J]. The study team also reviewed all available pertinent secondary documentation providing background on socio-economic conditions in Afghanistan generally and specifically in the ESA to gain a better understanding of the study issues.

### *4.2.1 Study Design*

In line with the objectives of the study, **absence of baseline** measurement observation necessitated adoption of **Post-test Control Group Operations Research Design.** The study is thus designed to evaluate impact(s) using ***`with-and-without'*** electricity scenario within and **outside Electrical Service Area (ESA) to observe the impact of electrification on different** categories of customers–households, irrigation equipment (pump owners and plot owners), industry, and commercial units, public health, security and others. Customers using electricity is regarded as **treatment** and those not-using electricity as **control** variable.

An additional sample category for households - the households without electricity in the electrical service area (ESA), is also included in the study design to evaluate the **spillover effect** of electrification. In urban center, it is almost impossible to find out a control zone, and therefore, the study primarily depends on people's perception and memory recall for gathering baseline data in the urban center. However, the whole study depends heavily on **cross-section** data rather than **time-series** due to absence of baseline information.

A two-stage survey method is applied to identify target households, agriculture, service, industry and commercial units: Scoping Survey and Detailed Questionnaire Survey.

A local well-experienced survey contractor, Social Development and Legal Rights (SDLR), was engaged for scoping and fielding detailed questionnaire surveys. The scoping survey identified 14 City Wards [10 in Kandahar and 4 in Lashkar Gah], and 18 "commercial" villages and 377 rural settlements [58] in the 3 rural districts in Helmand province [Sangin, Kajaki and Musa Qala] - see Scoping Report Annex K.

### *4.2.2 Sampling*

**Settlements**

In terms of settlements [City Wards and Commercial Villages], 50% were randomly selected for the purpose of the study. These two categories of sample therefore cover 7

[58] A 'commercial' village is defined as having a market with 5 or more commercial units/shops, while a rural village has a market with less than 5 or zero.

wards and 9 commercial villages, and it can be hypothesized that they have **mostly** benefitted by the enhanced access to on-grid electricity.

The same number of sample [16] is randomly drawn from the category of electrified rural villages and from control villages [that have no on-grid electricity]. [59] The total number of sample wards/villages is therefore 48 - see the table below.

**Households**

Five households from each sample ward and ESA village will be selected without any bias in the field on a random basis for the questionnaire survey[60].

The total number of sample households is therefore 400 - see the table below.

**Markets**

One market will be surveyed for each sample settlement and commercial village, and 5 from electrified rural villages and 5 from control villages for a total of 26. 5 in-depth surveys of individual stall owners will be carried out for each of the market sample i.e. 105 market proprietors from within the ESA and 25 from outside – see table below.

In terms of **number** of questionnaires to be fielded, a total of 604 will be completed and are broken down as follows:

| | |
|---|---|
| A1 | 160 electrified households in the ESA |
| A2 | 160 non-electrified households in the ESA |
| A3 | 80 control households outside the ESA |
| B1 | 32 settlements [wards and villages] inside ESA |
| B2 | 16 villages outside ESA |
| C1-A | 21 markets surveyed within ESA |
| C1- B | 5 markets surveyed outside ESA [control] |
| C2-A | 105 shops/industries/commercial units surveyed within ESA |
| C2-B | 25 shops/industries/commercial units surveyed outside ESA [control] |

[59] The 2009 Socio-Economic Baseline Study of Bamyan-Doshi Road covered 35% of the villages, and the corresponding figure was lower for the Impact assessment studies of Kabul-Kandahar and Kandahar-Doshi Roads. On this count, sample size taken for the present study appears to be more representative.

[60] The above three studies selected 3-4 households from each sample village.

**Table 9: Sampling Table**

| | | Sample no. of settlements [wards and villages] | Sample no. markets | Sample no. market stalls | Sample households [HH] within ESA | | Sample Control HH [A3] | Total questionnaires |
|---|---|---|---|---|---|---|---|---|
| | | | | | Electrified [A1] | Non electrified [A2] | | |
| within ESA | District Centre/ City wards | 7 [B1] | 7 [C1-A] | 35 [C2-A] | 35 | 35 | - | 119 |
| within ESA | Commercial Villages | 9 [B1] | 9 [C1-A] | 45 [C2-A] | 45 | 45 | - | 153 |
| within ESA | Electrified Rural Villages | 16 [B1] | 5 [C1-A] | 25 [C2-A] | 80 | 80 | - | 206 |
| outside-ESA | Control Villages | 16 [B2] | 5 [C1-B] | 25 [C2-B] | - | - | 80 | 126 |
| | TOTAL | 48 | 26 | 130 | 160 | 160 | 80 | 604 |

Note: the letter in brackets in the table above denotes the type of questionnaire deployed

The household questionnaire partially gathers information on agriculture, service, industry and commercial activities. In addition, **purposive sampling technique** will be applied to select agriculture, service, industry and commercial units for more detailed information.

Data collection techniques applied, include both ***quantitative*** and ***qualitative*** methods.

### *4.2.3 Impact Indicators, Survey Questionnaires and Enumeration*

The indicators embedded in the SOW are all captured by survey questionnaires. The study team developed 9 sets of questionnaire [see above]. All the above sets of questionnaires are translated into Pashto. SDLR was engaged to conduct the questionnaire survey in the field. The survey was divided into the following parts:

**Household Survey [A1, A2 and A3]**

Households are the basic economic unit of Afghan society, and the survey questionnaires developed for this activity provide a useful description of their current economic and social circumstances. These questionnaires seek information on topics such as family size, employment characteristics, wealth and assets, education and health care practices, agricultural production, and gender issues. In addition, the questionnaires attempt to relate the benefits of these characteristics to the electrical improvements and to increased electrical usage by household members. Households will also be asked if electrical meters are installed and their monthly electrical costs, and payment.

**Settlement Demographic Survey [B1 and B2]**

At the village level, a separate questionnaire will be used to collect information about the village's population, its schools and clinics, its agricultural land base and its available amenities, as well as the current availability of electrical power [for those villages within ESA] and any historical data that may be provided. The two sets of questionnaires [B1 for settlements within ESA and B2 for those outside ESA] are to be completed through interviews with village leaders and/or village groups.

**Agriculture /Irrigation Survey**

Surveys of electrical/solar pump users, diesel pump users and non- users of such technology will be carried out. This information will be captured in the above two survey instruments i.e. households and settlements.

**Shopkeeper/Commerce and Industry (including service sector) Survey [C1-A, C1-B, C2-A, C2-B]**

The diverse nature of the Commerce, Industry and Service sector consumers preclude the use of a standard questionnaire. Managers of several different types of commercial, and industrial businesses, and service units (including health services) will be interviewed using structured and/or semi-structured questionnaire.

**Photo 12: Traders participating in the survey**

### *4.2.4 Quality Assurance and Reliability of Data*

SDLR is an experienced contractor of field surveys. The firm has worked with Checchi on a number of USAID funded projects involving the collection of field-level information. SDLR has a good database of local persons nation-wide who are experienced and reliable in data collection.

The SDLR employed a team of 60 persons as follows:

- 1 Project Manager
- 1 Field Coordinator
- 5 Field Supervisors
- 17 field teams of 3 enumerators, including one female
- 1 data analyst
- 1 translator

Persons with more experience are employed as Supervisors. Immediately following the scoping survey, SDLR will arrange and conduct a 3-day Training-of-Trainer program for the Project Manager and Supervisors on data collection process, cross-checking techniques, accuracy of data and filling in questionnaire. The Field Coordinator supported by the Project Supervisors will then convene a one-day training program for the 51 Enumerators in Kandahar City. SDLR will prepare the excel sheets for data encoders.

It is the responsibility of the Enumerators to collect information at household/village level, fill-in structured questionnaire, and submit completed questionnaires to their supervisor.

**Photo 13: Field Surveyors gathering data**

The Supervisors check each filled-in questionnaire at the field station. If they find any inconsistencies, an investigation is launched. The Supervisors will also visit a sample of households which have already been interviewed by the investigators to spot-check households interviewed and verify the accuracy of data compiled.

Once the questionnaires have been checked for accuracy, they will be sent in batches to SDLR HQ in Kabul and data encoders insert data on excel sheets.

The field survey was completed in 3 weeks by 17 teams of 3 people. Surveying in a war zone present unique challenges – enumerators under real danger [Sangin Supervisor had his home searched twice by the Taliban during the survey], and it is life-threatening for interviewees as well [many did not want to reveal names]. It was ill-advised to take forms into the field and random sampling entailed finding ‘permissive’ community leaders to advise on ‘friendlies’ in a village. Finally, the completed forms had to be ‘smuggled’ to Kabul for encoding.

The study team depended on the experience of field surveyors and the reputation of SDLR for data quality and reliability, although the study team observed the training session for the project manager and supervisors, and clarified questions raised by the trainees. At the field station while in Kandahar and Lashkar Gah, the study team met with SDLR Project Supervisors to discuss challenges and progress, and to offer advice.

## 4.3 Targeted Stakeholders and Key Informants

### *4.3.1 Focus Group Discussions*

The survey team conducted focus group meetings with two different groups - staff at Kajaki Dam who are also residents of nearby Kajaki District, and entrepreneurs/industrials owing/operating light manufacturing enterprises in Kandahar who are also residents of that City [see Annex L for write-ups of these two FGDs].

**Photo 14: Focus Groups - Kajaki HPP Staff and Kandahar Businessmen**

### *4.3.2 Key Informant Interviews*

Interviews were conducted with 'key informants' to ascertain their views, opinions and perspectives on on-grid electrification efforts in ESA and its effects on people's lives and livelihoods, especially from representatives of the government of the Islamic Republic of Afghanistan's [IROA]. Interviewees included Provincial Governors, senior Local Government Officials, Community Leaders, Chamber of Commerce and Industry representatives, and entrepreneurs and shop owners.

These Key Informant Interviews, particularly those involving senior government officials, were performed by Study Team. The study team has developed a semi-structured questionnaire/interview guide for soliciting information from stakeholders and key informants [see Interview Guides Annex M].

**Photo 15: DABS Kandahar and Lashkar Gah Meetings**

# 5.0 FINDINGS & ANALYSIS

In this assignment, the consultants were tasked with:

- Assessing the **difference in generated and available power supply in the ESA** due to a] upgrading Kajaki Hydro Power Plant and b] installing diesel power plant [diesel generator sets] and a sub-station i.e. nature and extent of improved electrical supply.
- Assessing the **impact of on-grid electrification** on residents with respect to: human development [income & employment, standard of living, poverty reduction and gender equality]; irrigation and agriculture; industrial development and commercial activities; water, health & hygiene, and sanitation; public services - health and education; social environment and protective security.
- Assessing the perception of the stakeholders and beneficiaries on **continuing problems and constraints** in electricity supply.

## 5.1 Differences in Available Power Supply in the ESA

### *5.1.1 Power Supply Measures*

According to the SOW, the consultants are required to show the differences in available power supply, as well as the differences between power generated and utilized, as a result of investments made by USAID from 2003-09 in the on-grid electrical infrastructure in SEPS.

According to the data provided by DABS to the consultants during the June field trip, and subsequently verified through telephone and email, there is definite improvement in on-grid electricity supply in the ESA from 2003 to 2009.

Before we look at the data in the tables, it is important to understand the system for generating [production], dispatching [distribution] and receiving [available] grid electricity power.

Power supply in the SEPS can be broken down into:

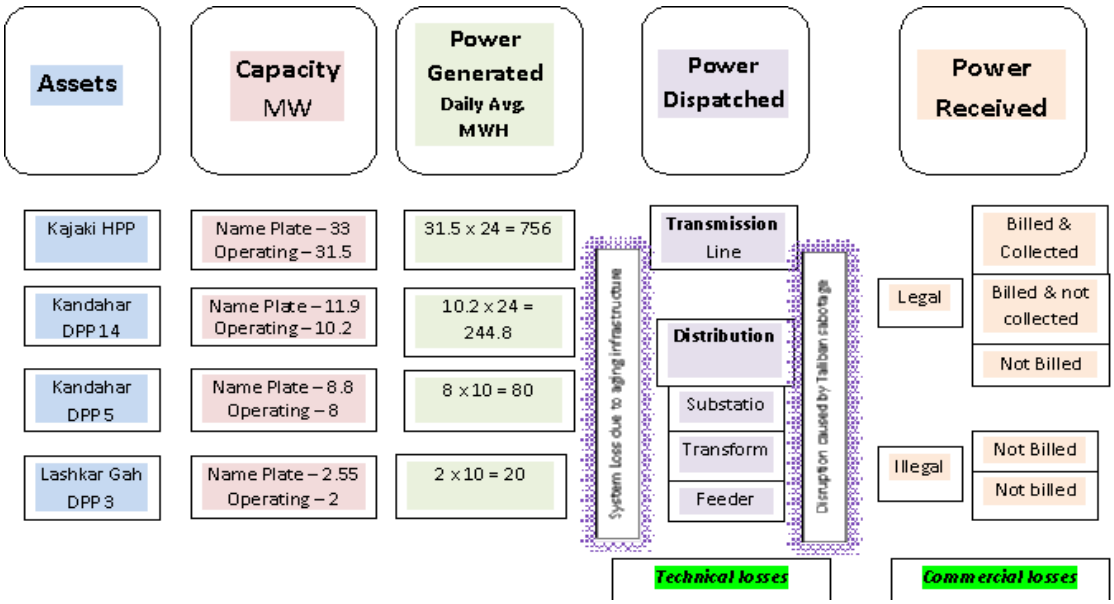
- capacity - nameplate or installed capacity, and operating capacity in MW of electrical assets;
- production - amount of power being generated by the assets in MWh;
- distribution – amount of power dispatched or transported in MWh [transmission & distribution deficiencies, and disruption/sabotage lead to technical losses];
- available – amount of power in MWh received by consumers who can be:
    - customers [legal]
        - billed and collected [regular business practice]
        - billed but not collected [incompetence or corruption]
        - not billed [incompetence or corruption]
    - other end-users [illegal]
        - billed [incompetence or ignorance]

- billed [corruption]

Both legal and illegal consumers are beneficiaries. Incompetent and corruption constitutes failure to collect normally by DABS and these are regarded as commercial losses.

The electrical utility was semi-privatized last year i.e. made to operate on a more commercial footing. DABS Head Office in Kabul realizes there is big problem with collecting and reporting data and this is s a priority for them. In Herat for instance, there is ample power and the reporting is very poor. Once conclusion is that the field office may not want the head office to know exactly how much power is generated and in particular how much power is made available, as then it would be apparent how much revenue should be collected thus indicating the amount of lost revenue, and the extent of incompetence and/or corruption.

**Figure 1: SEPS Overview**




A table has been constructed to show the **differences in available power supply** [i.e. improved access to on-grid electricity] in the ESA from 2003-09 due to upgrading of Kajaki Hydro Power Plant and installation of diesel generator stations, and another for electricity rationing.

The data for these tables was provided by DABS in Kandahar. Two things to bear in mind about the reality in the field:

- Power produced - the amount generated is in MWh i.e. the operating capacity of the asset multiplied by the number of hours in operation. The first is known and constant but the latter is a variable – the level of the water in the Dam may impede the HPP operating 24/7, and the condition of the generators and supply of diesel may reduce hours of operation.
- Power consumed – the amount of power in MWh received by consumers cannot at this time be accurately calculated. In Kabul they are installing devices at

substations and transformers to measure power that is received. While for all consumers – households, businesses, commercial entities, and institutions such as government, hospitals, schools, and religious establishments – they will be installing meters to measure consumption. The amount made available can then presumably be compared to the amount consumed.

But the in Kandahar and Lashkar Gah DABS is a long way from being able to measure power made available i.e. received by beneficiaries.

In addition, for the last five years the government has not been able to function in the northern part of Helmand Province making data collection on power received by consumers there impossible.

The diagram below illustrates the nature of system losses, though not to scale.

**Figure 2: Dispatched Power IN ESA**

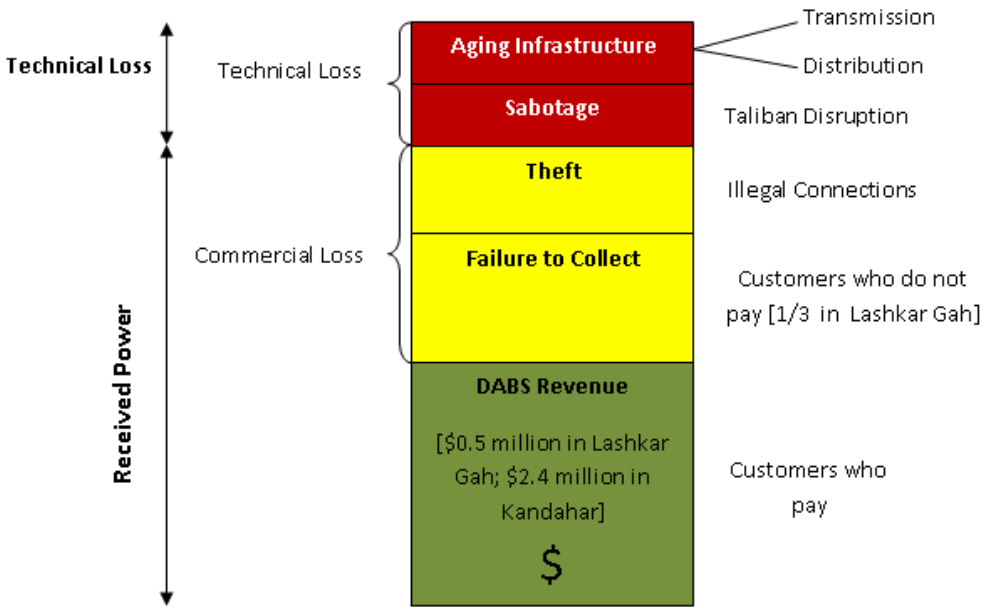


**Table 10: Power Supply Measures**

| SYSTEM CAPACITY, POWER GENERATION & AVAILBILITY / IMPROVEMENTS IN ELECTRICITY SUPPLY | Name plate capacity MW | Operating capacity MW | Total power generated by assets [capacity x hrs] | Power dispatched MW *[mwh/d]* | | | | | Total Power available to end-users [less 2.5% loss] | Power received MWH/D | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Kandahar | Lashkar Gah | Sangin | Tangi/Kajaki[61] | Musa Qala | | Kandahar | Lashkar Gah | Sangin | Tangi/Kaja | Musa Qala |
| Power generated at Kajaki **prior** to Nov. 2003 [normally operating 24 hour/7 days] | 2 x 16.5 | #1=4 #3= 12 | 16 *384* | 6 *144* | 2 *48* | 2 *48* | 3 *72* | 3 *72* | 374.4 | 140.4 | 46.8 | Taliban controlled territory | | |
| Power **after** installing 14 KTA 50 [X 850 KW] diesel generators in Kandahar Nov. 1 2003 [24/7] | 11.9 | 10.2 | 7[62] *168* | 7 *168* | | | | | 163.8 | 163.8 | | | | |
| **Cumulative TOTAL** | **44.9** | **26.2** | **23** ***552*** | **13** ***312*** | **2** ***48*** | **2** ***48*** | **3** ***72*** | **3** ***72*** | **538.2** | **304.2** | **46.8** | | | |
| Power **after** installing 3 KTA50 diesel generators [X 850KW] in Lashkar Gah April 1, 2004 [10 hrs day] | 2.55 | 2 | 2 *20* | | 2 *20* | | | | 17.5 | | 17.5 | | | |
| **TOTAL** | **47.45** | **28.2** | **25** ***572*** | **13** ***312*** | **4** ***68*** | **2** ***48*** | **3** ***72*** | **3** ***72*** | **569.5** | **304.2** | **66.3** | | | |
| Power **after** rehabilitating Unit 1 Kajaki Dam Sept. 12, 05 [24/7] | 2 x 16.5 | #1=16.5 #3=12 | 12.5 *300* | 4 *96* | 5 *120* | 1.5 *36* | 1 *24* | 1 *24* | 292.5 | 93.6 | 117 | | | |
| **TOTAL** | **47.45** | **40.7** | **37.5** ***872*** | **17** ***408*** | **9** ***188*** | **3.5** ***84*** | **4** ***96*** | **4** ***96*** | **850.2** | **397.8** | **183.3** | | | |
| Power **after** installing 5 QSK60 [X 1760KW] diesel generators in Kandahar on Nov. 1, 2008 [6-15 hrs] | 8.8 | 8 | 6[63] *72* | 6 *72* | | | | | 70.2 | 70.2 | | | | |
| **TOTAL** | **56.25** | **48.7** | **43.5** ***944*** | **23** ***480*** | **9** ***188*** | **3.5** ***84*** | **4** ***96*** | **4** ***96*** | **920.4** | **468** | **183.3** | | | |
| Power **after** rehabilitating Unit 3 Kajaki Dam Oct. 4 , 09 [24/7] | 16.5 + 15.[64] | 16.5 + 15 | 3 *72* | 2 *48* | 0.5 *12* | -0.3 *-7.2* | 0.4 *9.6* | 0.4 *9.6* | 70.2 | 47 | 11.7 | | | |
| **TOTAL** | **55.25** | **51.7** | **46.5** ***1016*** | **25** ***528*** | **9.5** ***200*** | **3.2** ***76.8*** | **4.4** ***105.6*** | **4.4** ***105.*** | **990.6** | **515** | **195** | | | |

[61] Tangi sub-station upgraded, shared with Musa-Qala. Musa Qala also has a small DPP but operating status is not known.

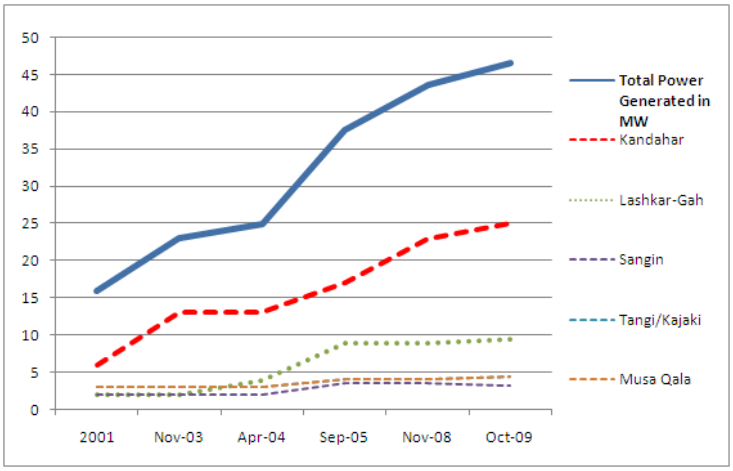
[62] Normally two generators are off for maintenance and repair but currently 3 are 'down'.

[63] Five back-up generators only used during peak times and when Kajaki HPP is disrupted.

[64] Unit 3 had a 'quill' problem so a component was removed last year resulting in slightly reduced capacity.

Due to USAID investment from 2003-09 in rehabilitation of Kajaki HPP and installation of additional electricity generation assets [DPPs], **operating capacity** increased from 16MW to 51.7MW overall – more than tripled. On a district basis, the amount of power sent or **dispatched** from these electrical generation assets increased 4x to Kandahar, almost 5x to Lashkar-Gar but only increased 2/3 to Sangin, and 50% to Tangi/Kajaki and Musa Qala – see below.

**Graph 1: Increased Grid Electricity Generated in ESA due to USAID Interventions 2003-09**




### *5.1.2 Electricity Rationing*

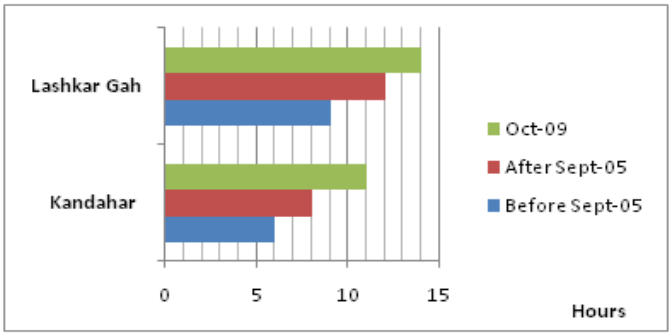
The study was required to show the differences in electricity rationing over the 2003-09 period as a result of USAID interventions in power generation.

**Table 11: Electricity Rationing**

| Increases in available electricity [hrs.] | Kandahar | Lashkar Gah |
|---|---|---|
| Hours of electricity rationing [available daily ave.] **before** rehabilitation of Kajaki Dam/HPP Unit 1 Sept. 12, 2005 | 6 | 9 |
| Hours of electricity rationing [available daily ave.] **after** rehabilitation of Kajaki Dam/HPP Unit 1 Sept. 12, 2005 | 8 | 12 |
| Hours of electricity rationing [available daily ave.] **after** rehabilitation of Kajaki Dam/HPP Unit 3 on Oct. 4, 2009 | 11 | 14 |

According to DABS, electricity available has improved considerably in the ESA - on average almost doubled in Kandahar to 11 hours per day, and increased by over half in Lashkar Gah to 14 hours per day.

**Chart 1: Hours of Grid Electricity Available per Day**




However, in conversations with government officials and others in these communities, it appears electricity is available much less than the 50% 'load-shedding' indicated by DABS.

The Power Supply Measures table purports to show the differences between current power **generated** or dispatched by Kajaki HPP and the 2 DPPs, and current electricity **available** to, or received by, end-users from 2003-09. The difference is referred to as **system loss**.

Unfortunately, it has proven impossible to obtain from DABS data on electricity supply actually received by end users or consumers.

Interestingly, the table shows negligible system losses even though the DABS management indicated to the consultants that losses were around 20% and the Kandahar Governor and others stating it was much higher – maybe 40% to 50%.

The high system loss is due to a number of factors: the aging SEPS infrastructure [dilapidated generation, transmission and distribution infrastructure], system 'leakages' [theft or illegal connections] as well as frequent disruptions to service caused by sabotage to lines and towers by Taliban. The extent of 'failure to collect' is considerable - perhaps half of customers are not billed or do not pay their bills without any sanction.

## 5.2 Impact of Grid Electrification in the ESA

The analysis of effects of improvements in on-grid electrical supply in this section rely heavily on field research supported by secondary sources of information derived from documentation and consultations to contextuate the study findings. As data was generated from the field survey, it was collated and tables for analysis constructed[65].

Mean and frequency of variables were then calculated, and inter-group differences of any variable with standard deviations estimated and tested for statistical significance. This final report is therefore based on sound statistical information and analysis.

[65] All the encoded field data is provided to USAID on an accompanying CD.

### *5.2.1 Social and Economic Impact*

The economic and social impacts of electrification at the household level are multidimensional as well as tangible and intangible. Household level impacts are mediated through availability of electricity in the home as well as outside (agriculture, commercial activities such as shops and establishments, and industry). Regarding external impacts, benefits flow not only to the people who are connected to the grid but also to unconnected persons living within the Electrical Service Area (ESA).

The multifaceted benefits are either direct or indirect. Direct impacts are mostly economic and reflected in enhanced income and employment, optimized expenditure pattern, and asset accumulation. Most indirect impacts are related to social and cultural aspects of life, including education, health, women's status, modernization, security etc. These direct and indirect benefits interact together to produce synergy in economic growth, poverty reduction and human development.

### *5.2.2 Impact on Income & Poverty*

The average annual **income** of ESA grid-connected households in the city center is 14.22 times higher than that of non-grid connected households in the city center, yet only 3.83 times higher than that of the households outside ESA. No significant difference is observed between the annual income of grid-connected households and non-grid connected households in the commercial villages within ESA. A strange observation is that in ESA rural settlements, households without grid-connection show 1.76 times higher income than grid-connected households.

The present picture is however gloomy when incidence of **poverty** is examined. The Table below reported the averages for household income and their quintile picture. As there are no reliable statistics about the poverty line in the Afghan economy, according to international standards of measurement of poverty in developing countries, people are regarded as “extremely poor” when per capita income per day is $1 or less. The average family size in the study area is about 6.6. On this count, 2nd to 5th (except 1st) quintiles clearly fell below the poverty line. The Afghan Government’s 1386 (2007) National Risk Vulnerability Assessment (NRVA) study considers the poverty line to be per capita income of US$14 per month. Using this measure, about 80% of sample households within ESA and outside ESA fell below the poverty line. Given the importance of electricity, it is very likely that electrification will provide a platform for other associated efforts that might result in reducing poverty in the ESA.

**Table 12: Annual Household Income within and outside ESA**

| Quintile | **Households within ESA** (Annual income in afs) | | | | | | **Households outside ESA** |
|---|---|---|---|---|---|---|---|
| | **Grid-connected HHs** | | | **HHs without grid-connection** | | | |
| | City Centers | Commercial Villages | Rural Settlements | City Centers | Commercial Villages | Rural Settlements | |
| First quintile (Highest) | 3299536 | 2198673 | 711572 | 153172 | 2070472 | 1261684 | 682076 |
| 2nd quintile (Medium high) | 1276236 | 1408017 | 446968 | 96280 | 1253786 | 1103974 | 389758 |
| 3rd quintile (Medium) | 971185 | 812318 | 271756 | 61269 | 874199 | 504674 | 230607 |
| 4th quintile (Medium low) | 659907 | 541545 | 196666 | 44638 | 690157 | 378505 | 146159 |
| 5th quintile (Lowest) | 261473 | 305787 | 53636 | 15755 | 230052 | 157710 | 81199 |
| **All-average** | **1245108** | **1083090** | **357574** | **87527** | **1150262** | **630842** | **324798** |

It is obvious from the table below that sale of agricultural output/produce, and wage-earning & salary, are two major sources of income for all categories of households, both within ESA and outside ESA. Grid-connected households show no significant impact on sale of own-made goods and services. The percentage shares of sale of own-made goods and services to total income for grid-connected households in the city centers, commercial villages and rural settlements are 3.73%, 16.52%, and 6.71% respectively. The corresponding figures are higher for the non-grid connected households within ESA – 29.15%, 27.02% and 11.50%. This might partly explain why non-grid connected households within ESA find opportunities of selling own made product and services.

**Table 13: Sources of Annual Income earned BY HH within and outside ESA**

| Sources of income | **Households within ESA** (Annual income in afs) | | | | | | **Households outside ESA** |
|---|---|---|---|---|---|---|---|
| | **Grid-connected HHs** | | | **HHs without grid-connection** | | | |
| | City Centers | Commercial Villages | Rural Settlements | City Centers | Commercial Villages | Rural Settlements | |
| Selling agricultural output | 74109 (5.95) | 796089 (73.52) | 261225 (73.05) | 1709 (1.95) | 745794 (64.84) | 464582 (73.64) | 190375 (58.61) |
| Selling own made goods and own services | 46514 (3.73) | 182080 (16.52) | 23980 (6.71) | 25516 (29.15) | 310798 (27.02) | 72582 (11.50) | 6400 (1.97) |
| Wage-earning and salary | 1069117 (85.82) | 84512 (7.81) | 45014 (12.59) | 58086 (66.37) | 90696 (7.88) | 88941 (14.10) | 124215 (38.25) |
| Any other | 56368 (4.50) | 20409 (1.88) | 27355 (7.65) | 2216 (2.53) | 2974 (0.26) | 4739 (0.76) | 3808 (1.17) |
| **Total** | **1245108 (100)** | **1083090 (100)** | **357574 (100)** | **87527 (100)** | **1150262 (100)** | **630842 (100)** | **324798 (100)** |

*NB: Figures in the parentheses indicate percentages of column total.*

In the table below, 68.57% of the grid-connected households in the city center and 20% in commercial villages indicated that their family income increased after being connected to the grid. Households within the ESA having no grid-connection stated that their incomes did not increase after their neighborhood were connected to the grid.

**Table 14: Family Income Increase since Grid Connection**

| Whether family income increased | Households within ESA (No. of Households) | | | | | |
|---|---|---|---|---|---|---|
| | Grid-connected HHs | | | HHs without grid-connection | | |
| | City Centers | Commercial Villages | Rural Settlements | City Centers | Commercial Villages | Rural Settlements |
| Yes (% of income increase) | 24 (32.1) | 9 (23.5) | - | - | - | - |
| No | 11 | 36 | 80 | 35 | 45 | 80 |
| **Total** | **35** | **45** | **80** | **35** | **45** | **80** |

The table below shows that in the city center, family income increased due to more job opportunities and improved production, and in commercial villages family income increase is due to improved production, more sales of product and more job opportunities.

**Table 15: Sources of Family Income Increase since Electricity Supply Improvement**

| Sources of family income increase | Grid-connected households within ESA (Frequency of Households) | | | | |
|---|---|---|---|---|---|
| | City Centers | | Commercial Villages | | Rural Settlements |
| | No. of HH | % | No. of HH | % | - |
| Established business | - | - | - | - | - |
| More job opportunities | 12 | 50.00 | 3 | 33.33 | - |
| Sold more | - | - | 4 | 44.44 | - |
| Improved production | 12 | 50.00 | 2 | 22.23 | - |
| **Total** | **24** | **100** | **9** | **100** | - |

### *5.2.3 Impact on Expenditure Pattern*

Overall, average annual expenditures of grid-connected households in the city center and commercial villages are higher than those of non-grid connected households within ESA. No significant difference is observed between the annual expenditure of the grid and non-grid connected households within ESA. However, expenditure pattern varies between different categories of households. As expected, food items account for the highest share of the total expenditure in all categories for households both within ESA and outside ESA.

The second most important item of expenditure is clothing, with exception of grid-connected households in the commercial villages within ESA, where transportation cost is next to food items. The table also depicts that expenditure on overall energy consumption (including grid-electricity/diesel power, traditional fuel, cow-dung, etc.) by grid and non-grid connected households in the commercial villages is higher than that in the city centers. The expenditures on schooling and education, and recreation and recreational items, are higher for grid-connected city center households than all other categories of

households, but the expenditure on these two items item as a percentage share of total expenditure is not significant.

**Table 16: Annual Expenditure Pattern of Households with and outside ESA**

| **Items of Expenditure** | **Households within ESA** (Annual expenditure in afs) | | | | | | **Households outside ESA** |
|---|---|---|---|---|---|---|---|
| | **Grid-connected HHs** | | | **HHs without grid-connection** | | | |
| | City Centers | Commercial Villages | Rural Settlements | City Centers | Commercial Villages | Rural Settlements | |
| Food items | 109914 (65.79) | 213678 (42.15) | 102700 (58.30) | 66434 (77.90) | 385408 (58.32) | 125924 (63.21) | 90203 (72.05) |
| Clothing | 29045 (18.12) | 72060 (14.31) | 36716 (20.84) | 12814 (15.02) | 139021 (21.03) | 26882 (15.92) | 19495 (15.57) |
| Schooling & education | 1192 (0.71) | 12294 (2.53) | 4721 (2.68) | 139 (0.16) | 8170 (1.24) | 6389 (3.31) | 124 (0.10) |
| Doctor and medicine | 19228 (11.66) | 31398 (6.70) | 15543 (8.82) | 4782 (5.61) | 61413 (9.29) | 19206 (9.95) | 9229 (7.37) |
| Recreation & recreational items | 285 (0.17) | 244 (0.05) | 128 (0.08) | 106 (0.12) | 121 (0.02) | 186 (0.10) | 125 (0.10) |
| Transportation | 797 (0.47) | 161753 (31.90) | 9392 (5.33) | 457 (0.54) | 51254 (7.75) | 10127 (5.24) | 5738 (4.58) |
| Energy/power incl electricity | 4905 (2.89) | 15343 (3.03) | 6846 (3.89) | 292 (0.34) | 15263 (2.31) | 4248 (2.20) | 102 (0.08) |
| Others | 328 (0.19) | 214 (0.04_ | 110 (0.06) | 255 (0.31) | 300 (0.04) | 128 (0.07) | 183 (0.15) |
| **Total** | **169654 (100)** | **506984 (100)** | **176156 (100)** | **85279 (100)** | **660950 (100)** | **193090 (100)** | **125199 (100)** |

NB: Figures in the brackets indicate percentages of column total

### *5.2.4 Impact on Employment and Diversified Occupation*

Electricity generates employment. The survey attempted to quantify employment and the degree of diversification of occupation of household members in the sampled settlements. Average employment participation by grid-connected household members in commercial villages is the highest at 5.56 per households, whereas household members in the centers are found to be involved in more diversified occupation. Employment participation of household members in commercial villages is limited to only 3 areas, whereas in the city centers household members participated in more than 12 occupations. It has already been shown in a previous table that the increase in family income of grid-connected households in city centers and commercial villages was more due to improved production and increased job opportunities.

**Table 17: Employment in Diversified occupations for HH members within and outside ESA**

| Type of Occupation | **Households within ESA** (Average number of family members involved) | | | | | | **Households outside ESA** |
|---|---|---|---|---|---|---|---|
| | **Grid-connected HHs** | | | **HHs without grid-connection** | | | |
| | City Centers | Commercial Villages | Rural Settlements | City Centers | Commercial Villages | Rural Settlements | |
| Agricultural activity on own land | 0.77 | 3.62 | 2.26 | 0.45 | 2.86 | 2.27 | 1.71 |
| Wage laborer | 0.20 | 0.62 | 0.50 | 0.20 | 1.08 | 0.50 | 0.71 |
| Office job | 0.05 | - | - | 0.02 | - | - | - |
| Barber | 0.02 | - | - | 0.05 | - | - | - |
| Metal workers | 0.02 | - | - | 0.05 | - | - | 0.01 |
| Wood carpenter | 0.05 | - | - | 0.05 | - | - | - |
| Bakeries | 0.08 | - | 0.01 | 0.02 | - | - | 0.02 |
| Dentist/Dental technician | 0.02 | - | - | - | - | - | - |
| Teachers | 0.02 | - | - | - | - | - | - |
| Shop-owners | 0.53 | 1.32 | 0.40 | 0.22 | 1.00 | 0.13 | 0.08 |
| Restaurant business | 0.02 | - | - | | - | 0.03 | 0.03 |
| Any other including juice-making and textile | 0.25 | - | 0.02 | - | 0.02 | 0.01 | 0.01 |
| **Total** | **2.03** | **5.56** | **3.19** | **1.06** | **4.96** | **2.94** | **2.57** |

An increase in activity hours after sun-set in the grid-connected households within ESA is not observed in rural settlements, whereas 8.6 percent of the grid-connected households in city centers 17.6% in commercial villages indicate that male family members increased activity after sun-set. The corresponding figures for the females in the city centers and commercial villages are 25.7 percent and 26.7 percent respectively. In the city center after sun-set, increased activity of female members is greater than males, whereas in commercial villages it is reversed.

**Table 18: Family members' Activity Hours after sun-set in grid connected HH within ESA**

| **Responses of Family Members on increase in activity hours** | **Grid-connected households** (No. of households) | | | | | |
|---|---|---|---|---|---|---|
| | City Centers | | Commercial Villages | | Rural Settlements | |
| | Yes | No | Yes | No | Yes | No |
| Male family members | 3 (1.30 ) | 32 | 8 (1.87 ) | 37 | - | 80 |
| Female family members | 9 (2.11) | 26 | 12 ( 1.64 ) | 33 | 1 (1.6 ) | 79 |

NB: Bracketed figures indicate average activity hours increased after sun-set

## *5.2.5 Impact on Asset Accumulation*

The nature and extent of energy-consuming/electric appliances in households both within and outside the ESA is shown in the table below.

- Within the ESA, 17% of grid-connected households in City Centers, 56% in commercial villages and 46% in rural settlements have TVs, while for those not connected to the grid it is 6%, 29% and 14% respectively[66]. Only 6% of HHs outside the ESA own a TV.
- Within the ESA, 100% of grid-connected households in City Centers, 98% in commercial villages and 29% in rural settlements possess radios, while for those not connected to the grid it is 88%, 93% and 90% respectively. 97% of HHs outside the ESA own a radio.
- Within the ESA, 29% of grid-connected households in City Centers, 13% in commercial villages and 39% in rural settlements possess a fridge/freezer, while for those not connected to the grid only 2% of HHs in commercial villages do so. No HHs outside the ESA owns a fridge.
- Within the ESA, 20% of grid-connected households in City Centers and 11% in rural settlements possess a computer, while for commercial villages, those not connected to the grid and also HHs outside the ESA it is zero.
- Within the ESA, 23% of grid-connected households in City Centers and 33% in rural settlements possess a cooker, while for those in commercial villages, those not connected to the grid and HHs outside the ESA it is zero.
- Within the ESA, 51% of grid-connected households in City Centers, 65% in commercial villages and 76% in rural settlements possess an iron, while for those not connected to the grid it is 6%, 22% and 7% respectively. Only 5% of HHs outside the ESA owns an iron.
- Within the ESA, 86% of grid-connected households in City Centers, 82% in commercial villages and 84% in rural settlements possess a fan, while for those not connected to the grid it is 6%, 62% and 16% respectively. Only 7% of HHs outside the ESA owns a fan.
- Within ESA, 6% of grid-connected households in rural settlements own a blender.
- Within the ESA, 31% of grid-connected households in City Centers, 47% in commercial villages and 54% in rural settlements possess a pump for well water, while for those not connected to the grid it is zero, 20% and 69% respectively. 61% of HHs outside the ESA owns a pump.

**Table 19: Energy Consumption Assets in HH with and outside ESA**

| **Energy consumed Assets** | **Households within ESA** (No. of households) | | | | | | | | | | | | **HHs outside ESA** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Grid-connected HHs** | | | | | | **HHs without grid-connection** | | | | | | | |
| | City Centers | | Commercial Villages | | Rural Settlements | | City Centers | | Commercial Villages | | Rural Settlements | | | |
| | With | With-out | With | With-out | With | With-out | With | With-out | With | With-out | With | With-out | With | With-out |
| TV[67] | 6 (17.1) | 29 (82.9) | 25 (55.5) | 20 (44.5) | 37 (46.2) | 43 (53.8) | 2 (5.7) | 33 (94.3) | 13 (28.9) | 32 (71.1) | 11 (13.7) | 69 (86.3) | 5 (6.2) | 75 (93.8) |

[66] Level of TV ownership is likely much higher as respondents generally fearful of Taliban reprisal.

[67] Residents deny having TVs due to fear of Taliban reprisal.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Radio | 35 (100) | - - | 44 (97.8) | 1 (2.2) | 23 (28.7) | 57 (71.3) | 30 (87.7) | 5 (12.3) | 42 (93.3) | 3 (6.7) | 72 (90) | 8 (10) | 78 (97.5) | 2 (2.5) |
| Fridge/ freezer | 10 (28.6) | 25 (71.4) | 6 (13.3) | 39 (86.7) | 31 (38.7) | 49 61.3) | - - | 35 (100) | 1 (2.2) | 44 (97.8) | - - | 80 (100) | - - | 80 (100) |
| Computer | 7 (20.0) | 28 (80.0) | - - | 45 (100) | 9 (11.2) | 71 (88.3) | - - | 35 (100) | - - | 45 (100) | - - | 80 (100) | - - | 80 (100) |
| Cooker | 8 (22.9) | 27 (77.1) | - - | 45 (100) | 26 (32.5) | 54 67.5) | - - | 35 (100) | - - | 45 (100) | - - | 80 (100) | - - | 80 (100) |
| Iron | 18 (51.4) | 17 (48.6) | 29 (64.4) | 16 (35.6) | 61 (76.2) | 19 (23.3) | 2 (5.7) | 33 (94.3) | 10 (22.2) | 35 (77.8) | 6 (7.5) | 72 (92.5) | 4 (5.0) | 76 (95) |
| Washing machine | 10 (28.6) | 25 (71.4) | 12 (34.3) | 33 (65.7) | 30 (66.7) | 50 (33.3) | - - | 35 (100) | 1 (2.2) | 44 (97.8) | - - | 80 (100) | - - | 80 (100) |
| Fan | 30 (85.7) | 5 (14.3) | 37 (82.2) | 8 (17.8) | 67 (83.7) | 13 16.3) | 2 (5.7) | 33 (94.3) | 28 (62.2) | 17 (37.8) | 13 (16.2) | 67 (83.8) | 6 (7.5) | 72 (92.5) |
| Blender | - - | 35 (100) | - - | 45 (100) | 5 (6.2) | 75 (93.3) | - - | 35 (100) | - - | 45 (100) | - - | 80 (100) | - - | 80 (100) |
| Pump for well | 11 (31.4) | 24 (88.6) | 21 (46.7) | 24 (53.3) | 43 (53.8) | 37 (46.2) | - - | 35 (100) | 9 (20) | 36 (100) | 55 (68.7) | 25 (31.3) | 49 (61.2) | 31 (38.8) |

### *5.2.6 Impact on Alternative Energy and Use*

In addition to grid electricity, the table below shows what other forms of energy are being used by grid-connected households in the ESA. 29% of HHs in City center, 69% in commercial villages and 59% in rural settlements uses their own generator [likely due to load-shedding], while 20% in commercial villages and rural settlements use a neighbor's generator. 80% of HHs in commercial villages and 3% in rural settlements use a car battery. 29% of HHs in city centers, 96% in commercial villages and 100% in rural settlements uses kerosene, diesel or petrol. 97% of HHs in city centers, 76% in commercial villages and 50% in rural settlements use fuel wood/lumber.

**Table 20: Types of Energy Consumed by Sample Grid-Connected HH within ESA**

| **Types of energy consumed** | **Grid-connected households within ESA** (Frequency of Households) | | | | | |
|---|---|---|---|---|---|---|
| | City Centers | | Commercial Villages | | Rural Settlements | |
| | No. of HH | % | No. of HH | % | No. of HH | % |
| Grid-electricity | 35 | 100 | 45 | 100 | 80 | 100 |
| Own Generator-electricity | 10 | 28.6 | 31 | 68.9 | 47 | 58.7 |
| Neighbor's Generator electricity | - | - | 9 | 20.0 | 16 | 20.0 |
| Car/Dry Cell battery | - | - | 36 | 80.0 | 2 | 2.5 |
| Kerosene/Diesel/Petrol | 10 | 28.6 | 43 | 95.5 | 80 | 100 |
| Fuel wood/lumber | 34 | 97.1 | 34 | 75.5 | 40 | 50.0 |

Within the ESA, 60% of grid-connected households in City Centers, 2% in commercial villages and 4% in rural settlements use grid electricity for cooking purposes, while for heating it is 11% for HH in city centers, 5% in commercial villages and zero in rural settlements. Electricity for lighting is used by all sampled households. Electricity for computers is only used in city centers – 9% of the City Centre HH sample.

**Table 21: Use of grid-Electricity by HH within ESA**

| Use of grid-electricity | Grid-connected households (Frequency of households) | | | | | |
|---|---|---|---|---|---|---|
| | City Centers | | Commercial Villages | | Rural Settlements | |
| | No. of HHs | % | No. of HHs | % | No. of HHs | % |
| Cooking | 21 | 60.0 | 1 | 2.2 | 3 | 3.7 |
| Heating | 4 | 11.4 | 2 | 4.5 | - | - |
| Lighting | 35 | 100 | 45 | 100 | 80 | 100 |
| Computer | 3 | 8.6 | - | - | - | - |
| Others | 2 | 5.7 | - | - | - | - |

### *5.2.7 Impact on Power Consumption and Availability*

In the table below, electricity is only available for households in City Centers 15 days per month, 11 days in commercial villages and 6 days for rural settlements. Electricity is only available for households in City Centers 7 hours on allocated days, 13 hours in commercial villages and 10 hours for rural settlements. Electric consumption for grid-connected households within the ESA is 362 kWh in City Centers, 156 kWh in Commercial villages and 8 kWh in rural settlements. Monthly expenditures on electricity are 678 afs in city centers, 827 afs in commercial villages and 871 afs in rural settlements.

**Table 22: Supply of Electricity to grid-connected HH within ESA**

| Grid-electricity supply | Grid-connected households | | |
|---|---|---|---|
| | City Centers | Commercial Villages | Rural Settlements |
| No. of days per month electricity supply is available | 14.8 | 10.66 | 6.22 |
| Hours of electricity supply available on allocated day | 7.48 | 12.97 | 9.83 |
| Electric energy consumption per month (kwh) | 362.1 | 155.7 | 7.93 |
| Monthly spending on electricity consumption (afs) | 678.5 | 827.3 | 871.2 |

100% of grid-connected households in City Centers use electric meters, while only 22% in commercial villages and 5% in rural settlements do so.

**Table 23: Grid-connected HH using electric meter within ESA**

| Any electric meter | Grid-connected households (No. of Households) | | |
|---|---|---|---|
| | City Centers | Commercial Villages | Rural Settlements |
| Yes | 35 (100%) | 10 (22.2%) | 4 (5.0%) |
| No | 0 (0%) | 35 (77.8%) | 76 (35%) |
| Total | 35 (100) | 45 (100) | 80 (100) |

### *5.2.8 Impact on Trade & Commerce*

The study surveyed 21 markets within ESA and all of them have grid-connection for electricity. Thirteen (13) of them were connected with grid-electricity before Kajaki HPP rehabilitation i.e. prior to 09/12/2005. After rehabilitation of unit 1 on 09/12/2005, seven (7) markets got grid connection. One market (1) was also observed to be connected after rehabilitation of unit 3 i.e. 10/04/2009. This is a clear indication of growth of more grid-connected markets due to rehabilitation of the Kajaki Hydro-Power (HPP).

**Table 24: Connecting Sample Markets in the ESA to the Grid**

| **Year of grid-connection** | **Markets within ESA (No. of sample markets )** | | | |
|---|---|---|---|---|
| | City Centers | Commercial Villages | Rural Settlements | **Total** |
| Before Rehab (prior to 09/12/2005) | 5 (71.43) | 5 (55.55) | 3 (60.00 | **13 (61.9)** |
| After Rehab Unit 1 (after 09/12/2005) | 2 (28.57) | 3 (33.33) | 2 (40.00) | **7 (33.3)** |
| After Rehab Unit 3 (after 10/04/09) | - | 1 (11.12) | - | **1 (4.8)** |
| **Total** | **7 (100)** | **9 (100)** | **5 (100)** | **21 (100)** |

The table below shows that after the grid-connection, neither the closing hour nor the total duration of opening hours was is extended. Though the opening hour remains almost as before, the closing hour contracted. Before grid-connection, markets in the city center and commercial villages closed at 07.00 pm and 06.30 pm respectively, now they close at 06.45 and 06.25 respectively. In the rural settlements, opening hour of the markets remains more or less as before, but the closing hour is contracted by about one hour.

**Table 25: Change in Opening & Closing Hours of ESA Markets after grid-connection**

| **Opening and closing hours** | **Within ESA** | | |
|---|---|---|---|
| | City Centers | Commercial Village | Rural Settlements |
| Before Grid-connection | | | |
| Opening hours (am) | 06.30 | 07.00 | 07.30 |
| Closing hours (pm) | 07.00 | 06.30 | 06.00 |
| Total Duration (hours) | 13.00 | 11.30 | 11.30 |
| After Grid-connection | | | |
| Opening hours | 6.30 | 07.00 | 07.45 |
| Closing hours | 06.45 | 06.25 | 06.00 |
| Total Duration | 12.15 | 11.25 | 10.15 |
| **Change in total (hours)** | **(-) 0.45** | **(-) 0.05** | **(-) 1.30** |

The study selected 105 shops and producing units for a detailed survey and all these units have grid-connected electricity. The table below depicts that lighting is the common purpose of using electricity by all the stalls. In addition, 71.43 percent of the shops in the

city centers, 40 percent in the commercial markets and 32 percent in the rural settlement within the ESA use grid-electricity for heating.

**Table 26: Usage of Grid-Electricity by Stalls/Units in ESA**

| **Purposes of using electricity** | **Markets within ESA** (No. of sample stalls and manufacturing units) | | |
|---|---|---|---|
| | City Centers | Commercial Villages | Rural Settlements |
| Lighting | 35 (100) | 45 (100) | 25 (100) |
| Producing | 1 (2.86) | 22 (48.89) | - |
| Heating | 25 (71.43) | 18 (40.00) | 8 (32) |

NB: Bracketed figures indicate % of total sample stalls in the respective category of settlements.

The table below depicts that the average sale volumes per day per stall were 56,286, 18,435 and 30,940 afs respectively in the city center, commercial villages and rural settlement markets within ESA before grid-connection. After the grid-connection, the corresponding figures were 62,314, 25,831 and 10,392 afs respectively. Thus, after grid-connection, sales volume increased by 18.71 percent in the city market stall, and 40.11 percent in the commercial market stalls, but fell by 66.4 percent in rural settlement market stall likely due to the attraction of electrified stalls in neighboring settlements plus improved road access.

**Table 27: Change in Sales for Grid-connected Stalls in ESA**

| **Sales** | **Markets within ESA** (Ave. sales per day per stall afs) | | |
|---|---|---|---|
| | City Centers | Commercial Villages | Rural Settlements |
| Before grid-connection | 56,286 | 18,435 | 30,940 |
| After grid-connection | 62,314 | 25,831 | 10,392 |
| % Change (increase +, decrease -) | + 18.71 | + 40.11% | (-) 66.4 |

Grid-electrification also impacted employment i.e. family labor and wage labor in the stalls. Though no change is occurred in the employment of family labor in the city center and the rural settlement market after grid-connection, the commercial market shows an increase of family labor by about 15.8 percent. After grid-connection, wage labor increased in city center, commercial village and rural settlement markets by 29.4 percent, 31.2 percent, and 18.7 percent respectively.

**Table 28: Change in Employment for ESA Stalls after grid-connection**

| **Employment** | **Markets within ESA** (Total employment per stall) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | City Centers | | | Commercial Villages | | | Rural Settlements | | |
| | Family labor | Wage labor | Total labor | Family labor | Wage labor | Total labor | Family labor | Wage labor | Total labor |
| Before grid-connection | 1.3 | 1.7 | 3.0 | 1.9 | 1.6 | 3.5 | 1.6 | 1.6 | 3.2 |
| After grid-connection | 1.3 | 2.2 | 3.5 | 2.2 | 2.1 | 4.3 | 1.6 | 1.9 | 3.5 |
| Change (increase +, decrease -) | (0) | + 0.5 | + 0.5 | + 0.3 | +0.5 | +0.8 | (0) | +0.3 | + 0.3 |

The study also attempted to quantify the volume of investment per stall before and after grid-connection. Before grid-connection, total investments per stall in the city center, commercial village and rural settlement markets were 2,453,486 afs, 1,063,635 afs and 638,800 afs respectively which increased 2,915,714 afs, 1,155,022 afs and 726,190 afs. Thus it becomes evident that after grid electricity, total investment per shop in the corresponding markets increased by 18.84 percent in city center, 8.60 percent in commercial villages and 13.68 percent in rural settlement markets. It is suspected that retailers in the rural areas invested in their business, despite declining sales, to try and stem the flow of trading activity moving to larger commercial villages.

**Table 29: Change in Investment for ESA Stalls after grid connection**

| **Investment** | **Markets within ESA** (Total investment per stall afs) | | |
|---|---|---|---|
| | City Centers | Commercial Villages | Rural Settlements |
| Before grid-connection | 2453,486 | 1063,635 | 638,800 |
| After grid-connection | 2915,714 | 1155,022 | 726,190 |
| % Change (increase +, decrease -) | + 18.84 | + 8.60 | + 13.68 |

### *5.2.9 Impact on Irrigation & Agriculture*

In an earlier table it is seen that except city center, income by selling agricultural output constitutes more than fifty percent of the annual income of the households. The table below shows no significant variation of cultivable landownership between the grid-connected and non-grid-connected households within ESA and outside ESA. There is a wide variation of ownership of cultivable land, which ranges from 2 geribs to 30 geribs. It is also evident from the table that both grid-connected and non-grid-connected households within ESA have higher share of land under irrigation than that of the households outside ESA.

**Table 30: Cultivable land, irrigated land and cropping intensity of HH with and outside ESA**

| **Items** | **Within ESA** | | | | | | **HHs outside ESA** |
|---|---|---|---|---|---|---|---|
| | **Grid-connected HHs** | | | **HHs without grid-connection** | | | |
| | City Centers | Commercial Villages | Rural Settlements | City Centers | Commercial Villages | Rural Settlements | |
| No. of HHs with cultivable land | 11 | 45 | 66 | 9 | 35 | 75 | 62 |
| (% of total HHs) | (31.43) | (100) | (82.50) | (25.71) | (77.78) | (93.75) | (77.50) |
| Range of cultivable land (geribs) | 3 - 15 | 4 - 28 | 1 - 17 | 2 - 30 | 4 - 20 | 3 - 30 | 2 - 30 |
| Average per HH (geribs) | (05.23) | (14.65) | (9.81) | (15.51) | (12.47) | (13.48) | (15.01) |
| Land under irrigation (%) | (93.33) | (95.04) | (79.25) | (79.25) | (82.51) | (91.27) | (78.25) |
| Cropping intensity (%) | 178 | 189 | 184 | 172 | 182 | 179 | 179 |

It was not possible to find out which type of pump machines (LLP, STW, DTW, etc.) are used by farmers who use electricity for irrigation.

### *5.2.10 Impact on Water & Sanitation*

**Table 31: Sources of Drinking Water in Sample Settlements within and outside ESA**

| Items | Within ESA | | | Outside ESA |
|---|---|---|---|---|
| | City Centers | Commercial Village | Rural Settlements | |
| % of people using common well | 13.57 | 37.11 | 31.82 | 21.37 |
| % of people using private well | 30.71 | 18.89 | 17.94 | 14.86 |
| % of people using other sources of water | 55.72 | 44.00 | 50.24 | 64.27 |
| Total | 100 | 100 | 100 | 100 |

In the table above, with respect to drinking water sources in sample settlements within the ESA, in City center/wards 13% of people use common wells, 32% use private wells and 55% use other water sources. In commercial villages, 37% of people use common wells, 19% use private wells and 44% use other courses. In rural settlements, 32% of people use common wells, 18% use private wells and 50% use other courses. Outside the ESA, 21% use common wells, 15% use private wells and 64% use other sources.

**Table 32: Uses of Latrines in Sample Settlements within and outside ESA**

| Items | Within ESA | | | Outside ESA |
|---|---|---|---|---|
| | City Centers | Commercial Village | Rural Settlements | |
| % of people using sanitary latrines | 32.14 | 4.37 | 5.06 | 3.12 |
| % of people using pit latrines | 0.71 | 7.78 | 3.23 | 13.43 |
| % of people using hanged latrines[68] | 37.86 | 40.62 | 40.71 | 45.31 |
| % of people using open space | 22.14 | 36.11 | 42.06 | 32.5 |
| % of people using any others | 7.15 | 11.12 | 8.94 | 5.64 |
| Total | 100 | 100 | 100 | 100 |

The table above shows that regarding latrines in sample settlements within the ESA, in City center/wards 32% of people use sanitary latrines, 1% use pit latrines, 38% use hanged latrines, 22% use open spaces and 7% use other means. In commercial villages, 4% of people use sanitary latrines, 8% use pit latrines, 41% use hanged latrines, 36% use open spaces and 11% use other means. In rural settlements, 5% of people use sanitary latrines, 3% use pit latrines, 41% use hanged latrines, 42% use open spaces and 9% use other means. Outside the ESA, 3% of people use sanitary latrines, 13% use pit latrines, 45% use hanged latrines, 32% use open spaces and 5% use other means.

[68] A bamboo platform several feet from the ground surrounded by flimsy corrugated tin walls for privacy

**Table 33: Carrying Water for grid-connected HH within ESA**

| Do HHs have to fetch water | Grid-connected households (No. of households) | | |
|---|---|---|---|
| | City Centers | Commercial Villages | Rural Settlements |
| Yes | 1 | 0 | 0 |
| No | 34 | 45 | 80 |
| Total | 35 | 45 | 80 |

The table above shows since being connected to electricity, 34% of HH in city center/wards and 45% of HH in commercial villages reported they no longer have to fetch water, and 80% in rural settlements.

### *5.2.11 Impact on Health Care*

**Table 34: Accessibility to Health Care facilities by grid-connected HH in ESA**

| Opening Hours and Service Delivery | Households within ESA (No of households) | | | | | |
|---|---|---|---|---|---|---|
| | City Centers | | Commercial Villages | | Rural Settlements | |
| | No. of HH | % | No. of HH | % | No. of HH | % |
| **Opening hours** | | | | | | |
| Remains as before | 7 | 20.00 | 45 | 100 | 45 | 100 |
| Increased | 25 | 71.43 | - | - | - | - |
| Decreased | 3 | 8.57 | - | - | - | - |
| Total | 35 | 100 | 100 | 100 | 100 | 100 |
| **Service delivery** | | | | | | |
| As before | 8 | 22.86 | 45 | 100 | 45 | 100 |
| Improved but not significant | 27 | 77.14 | - | - | - | - |
| Improved significantly | - | - | - | - | - | - |
| Total | 35 | 100 | 100 | 100 | 100 | 100 |

The table above reflects the opinion of grid-connected households within ESA regarding accessibility to local hospitals and clinics having electrical power. From the data it is apparent that households within commercial villages and rural settlements perceive no change in their access to health facilities having grid electricity, whereas ¾ of the households canvassed in city centers/wards believe that their access in terms of opening hours has increased and in terms of service delivery has improved though not significantly.

**Table 35: Perception of Sample Settlements in ESA about accessibility to health facilities**

| Opening Hours and Service Delivery | Within ESA (No of settlements) | | | | | |
|---|---|---|---|---|---|---|
| | City Centers | | Commercial Villages | | Rural Settlements | |
| | No. of Settlement | % | No. of Settlement | % | No. of Settlement | % |
| **Opening Hours** | | | | | | |
| Remains as before | 6 | 65.71 | 9 | 100 | 17 | 100 |
| Increased | 1 | 14.29 | | | | |
| Decreased | - | - | | | | |
| Total | 7 | 100 | 9 | 100 | 17 | 100 |
| **Service delivery** | | | | | | |
| As before | 6 | 65.71 | 9 | 100 | 17 | 100 |
| Improved but not significant | - | - | - | - | - | - |
| Improved significantly | 1 | 14.29 | - | - | - | - |
| Total | 7 | 100 | 9 | 100 | 17 | 100 |

The table above reflects the opinion of grid-connected settlements within ESA regarding accessibility to local hospitals and clinics having electrical power. The data suggest that commercial villages and rural settlements perceive no change in their access to health facilities since electricity supply was improved, whereas 1/7 of city centers/wards believe that their access in terms of opening hours has increased while access in terms of service delivery has improved significantly.

### *5.2.12 Impact on Education*

**Table 36: Number of Schools in grid-connected ESA Settlements**

| Grid-electricity supply | Within ESA | | |
|---|---|---|---|
| | City Centers | Commercial Villages | Rural Settlements |
| Total number of Primary schools | 7 | 2 | 0 |
| Total number of primary school connected with grid-electricity | 2 | 1 | 0 |
| % of total primary schools connected with grid-electricity | 28.57 | 50.00 | 0 |

With respect to schools within the ESA having grid electricity supply, the table above shows 2 out of 7 primary schools in City Centre/wards and 50% in commercial villages are connected, whereas no schools in rural settlements are connected to the grid.

**Table 37: Children's' Study Hours in grid-connected ESA HH**

| Study hours of children | Grid-connected households (hours/minutes) | | |
|---|---|---|---|
| | City Centers | Commercial Villages | Rural Settlements |
| Children involved in study on each night | 1hr 15 min | 1 hr. 10 min | 32 min |
| Study hours increased due to grid-connections | 40 min | 45 min | 10 min |

With respect to children's' night-time study in households within the ESA having grid electricity supply, the table above shows children on average study each night 1 hr. 15 min in city center/wards, 1 hr. 10 min in commercial villages and only 32 min in rural settlements, and that the time spent studying had increased by 40 min, 45 min and 10 min. respectively.

**Table 38: Children's' Learning Time in grid-connected HH within ESA**

| **Do children spend more time in learning** | **Grid-connected households** (% of households) | | |
|---|---|---|---|
| | City Centers | Commercial Villages | Rural Settlements |
| Yes | 34.28 | 35.55 | 6.25 |
| No | 65.72 | 64.45 | 93.75 |
| Total | 100 | 100 | 100 |

The table above shows that in homes having grid electricity supply within the ESA, households in both city center/wards and commercial villages reported over 1/3 of children spend more time in learning while respondents in rural settlements said only 6% spent more time learning .

**Table 39: School-Age Girls Attendance from HH within and outside ESA**

| **Do school-age girls attend school** | **Households within ESA** (% of Frequency of Households) | | | **Households outside ESA** |
|---|---|---|---|---|
| | City Centers | Commercial Villages | Rural Settlements | |
| Yes | 31.43 | 0 | 1.25 | 0 |
| No | 68.57 | 100 | 98.75 | 100 |
| **Total** | **100** | **100** | **100** | **100** |

The table above shows that in grid-connected homes within the ESA, almost 1/3 of households in city center/wards reported school-age girls were attending school whereas it was negligible in commercial villages and rural settlements, and as well zero in households outside the ESA.

**Table 40: Children per HH attending school within and outside ESA**

| **Items** | **Households within ESA** (Average no. per household) | | | | | | **Households outside ESA** |
|---|---|---|---|---|---|---|---|
| | **Grid-connected HHs** | | | **HHs without grid-connection** | | | |
| | City Centers | Commercial Village | Rural Settlements | City Centers | Commercial Villages | Rural Settlements | |
| Total School-going children | 3.46 | 3.84 | 1.86 | 2.08 | 2.19 | 1.27 | 1.27 |
| Male | 2.97 | 3.84 | 1.86 | 2.08 | 2.19 | 1.27 | 1.27 |
| Female | 0.49 | 0 | 0 | 0 | 0 | 0 | 0 |

The table above shows that in grid-connected homes in City Centre/wards within the ESA, there are on average 3.46 children attending school while in non-connected HH within ESA there are 2.08. Likewise, in grid-connected HH in commercial villages within the ESA there are 3.84 versus 2.19 in non-connected HH within ESA. For rural settlements, grid-connected HH have 1.86 school-going children and non-grid connected HH 1.27. This latter figure is the same as that for HH outside the ESA.

### *5.2.13 Impact on Security & Crime*

**Table 41: Street Lighting in Settlements within ESA**

| **Do settlements have street lighting?** | **Within ESA** (No. of Settlement) | | |
|---|---|---|---|
| | City Centers | Commercial Villages | Rural Settlements |
| Yes | 3 (42.85) | 2 (22.22) | 2 (11.76) |
| No | 4 (57.15) | 7 (77.78) | 15 (82.24) |
| Total | 7 (100) | 9 (100) | 17 (100) |

NB: Figures in the parentheses indicate column percentages

The table above shows that in sample settlements within the ESA, 43% of city center/wards, 22% of commercial villages and 12% of rural settlements have street lighting.

**Table 42: ESA Community perception about Security & Crime since enhanced electricity**

| **Security & crime** | **Within ESA** (No of settlements) | | |
|---|---|---|---|
| | City Centers | Commercial Villages | Rural Settlements |
| **Security situation** | | | |
| As before | 5 (71.43) | 8 (88.89) | 17 (100) |
| Improved but not significant | 2 (28.57) | 1 (11.11) | - |
| Improved significantly | - | - | - |
| Total | 7 (100) | 9 (100) | 17 (100) |
| **Crime and theft** | | | |
| As before | 5 (71.43) | 8 (88.89) | 17 (100) |
| Improved but not significant | 2 (28.57) | 1 (11.11) | - |
| Improved significantly | - | - | - |
| Total | 7 (100) | 9 (100) | 17 (100) |

Figures in the parentheses indicate column percentages

The table above reflects the opinion of a sample of grid-connected settlements within ESA regarding security and crime & theft. The data suggest that with respect to the security situation, 29% of city-center/wards and 11% of commercial villages said the situation had improved but not significantly, while rural settlements said that since electricity improvements there had been no change in security. With respect to crime & theft, 29% of city-center/wards and 11% of commercial villages said the situation had

improved though not significantly, while rural settlements said the situation was the same as before improvements in electricity supply.

**Table 43: Perception of HH in ESA about Security & Crime with enhanced electricity**

| Security situation and crimes and theft | Households within ESA (No of households) | | | | | |
|---|---|---|---|---|---|---|
| | HHs with electricity | | | HHs without electricity | | |
| | City Centers n=35 | Commercial Villages N=45 | Rural Settlements N=80 | City Centers N=35 | Commercial Villages N=45 | Rural Settlements N=80 |
| **Security situation** | | | | | | |
| As before | 11 (31.43) | 45 (100) | 80 (100) | 35 (100) | 45 (100) | 80 (100) |
| Improved but not significant | 24 (68.57) | - | - | - | - | - |
| Improved significantly | - | | - | - | - | - |
| Total | 35 (100) | 45 (100) | 80 (100) | 35 (100) | 45 (100) | 80 (100) |
| **Crime and theft** | | | | | | |
| As before | 15 (42.86) | 45 (100) | 80 | 35 (100) | 45 (100) | 80 (100) |
| Improved but not significant | 20 (57.14) | - | - | - | - | - |
| Improved significantly | - | - | - | - | - | - |
| Total | 35 (100) | 45 (100) | 80 (100) | 35 (100) | 45 (100) | 80 (100) |

NB: Figures in the parentheses indicate column percentages

The table above reflects the opinion of a sample of grid-connected households within ESA regarding security and crime & theft. The data suggests that with respect to the security situation, 68% of HH in city-center/wards said the situation had improved but not significantly, while HH in commercial villages and rural settlements said that since electricity improvements there had been no change in security. With respect to crime & theft, 20% of HH in city-center/wards said the situation had improved though not significantly, while HH in commercial villages and rural settlements said crime & theft was the same as before improvements in electricity supply.

For HH within the ESA without grid electricity, there was no perceived improvements in either the security situation or crime & theft since improvements in electricity supply.

### *5.2.14 Ability & Willingness to Pay for Connections*

In the table below, respondents who did not have grid-electricity inside and outside the ESA were asked whether they want to be connected to the main grid. 97% of HH in the ESA in City Centre, 100% in commercial villages and rural settlements, and 97.5% of HH outside ESA, indicated they wanted to be connected.

**Table 44: HH within and outside ESA Wanting Grid Connection**

| Responses | (No. of non-grid connected households) | | | |
|---|---|---|---|---|
| | Within ESA | | | Outside ESA |
| | City Centers | Commercial Villages | Rural Settlements | |
| Yes | 34 (97.14) | 45 (100) | 80 (100) | 78 (97.5) |
| No | 1 (2.86) | - | - | 2 (2.5) |
| **Total** | **35 (100)** | **45 (100)** | **80 (100)** | **80 (100)** |

NB: Figures in the parentheses indicate column percentages

Respondents who did not have grid-electricity inside and outside the ESA were then asked whether they were they would be willing and able to pay for the new connection. In the table below, 867% of ESA HH in City Centre, 36% in commercial villages, and 69% in rural settlements, and 54% of HH outside ESA, stated they were unable to pay for the hook-up, while 66%, 62% and 53% in the ESA respectively were not willing to pay, and outside the ESA it was 65%, likely due to the prohibitive connection costs, and application complexity and corruption.

In addition, 63% of ESA HH in City Centre, 96% in commercial villages, and 84% in rural settlements, and 73% of HH outside ESA, stated they found the new connection procedures to be complex. 20% of ESA HH in City Centre, 91% in commercial villages, and 70% in rural settlements, and 60% of HH outside ESA, reported that they were asked to make 'unofficial payments'. A large number had unsuccessfully tried to get connected – within ESA, 69% of HH in City Centre, 71% in commercial villages and 50% in rural settlements, and outside of ESA 20% of HH.

**Table 45: Willingness & Ability of HH within and outside ESA to pay for grid-connection**

| Responses on Reasons | (No. of non-grid connected households) | | | |
|---|---|---|---|---|
| | Within ESA | | | Outside ESA |
| | City Centers N=35 | Commercial Villages N=45 | Rural Settlements N=80 | N=80 |
| No ability to pay for initial cost | 30 (85.71) | 16 (35.55) | 55 (68.75) | 43 (53.75) |
| Not willing to pay for grid-connection | 23 (65.71) | 28 (62.22) | 42 (52.50) | 52 (65.00) |
| Complex official procedure to get new connection | 22 (62.86) | 43 (95.55) | 67 (83.75) | 58 (72.50) |
| Indirect cost of pleasing the official is high | 7 (20.00) | 41 (91.11) | 56 (70.00) | 48 (60.00) |
| Once tried but did not work | 24 (68.57) | 32 (71.11) | 40 (50.00) | 16 (20.00) |
| **Total** | **106 (302.65)** | **160 (354.88)** | **260 (399.25)** | **217 (271.25)** |

NB: In total column, number of households exceeded the number of sample households, indicating on an average each household responded more than one reason.

### *5.2.15 Reasons for Wanting Electricity*

In the table below:

- 51% of grid-connected HH within ESA within City Centre, 60% of HH in commercial villages and 47% in rural settlements, and 46% of non-grid connected HH within ESA, 49% of HH in commercial villages and 56% of HH in rural settlements, and 53% of HH outside the ESA, indicated that they wanted grid electricity for reasons of social prestige;
- 35% of grid-connected HH within ESA in City Centre, 67% of HH in commercial villages and 100% in rural settlements, non-grid connected HH within ESA in City Centre and in commercial villages, and 95% of HH in rural settlements, and 88% of HH outside the ESA, indicated that they wanted grid electricity to improve their standard of living i.e. a 'more comfortable life';
- 71% of grid-connected HH within ESA within City Centre, 68% of HH in commercial villages and 74% in rural settlements, and 86% of non-grid connected HH within ESA, 80% of HH in commercial villages and 82% of HH in rural settlements, and 80% of HH outside the ESA, indicated that they wanted grid electricity for recreation and entertainments [mostly TV];
- 100% of respondents indicated that they wanted electricity so that they could enjoy modern appliances such as fridges and computers, and in addition it was much cheaper than oil;
- 74% of grid-connected HH within ESA within City Centre, 71% of HH in commercial villages and 86% of HH in rural settlements, and 66% of non-grid connected HH within ESA, 67% of HH in commercial villages and 35% of HH in rural settlements, and 64% of HH outside the ESA, indicated that they wanted grid electricity for safety reasons.

**Table 46: Reasons for HH within and outside ESA to Desire Electricity**

| Preferences | **Households within ESA** (Frequency of HHs) | | | | | | **Households outside ESA** N=80 |
|---|---|---|---|---|---|---|---|
| | **Grid-connected HHs** | | | **HHs without grid-connection** | | | |
| | City Centers N=35 | Commercial Villages N=45 | Rural Settlements N=80 | City Centers N=35 | Commercial Villages N=45 | Rural Settlements N=80 | |
| Social Prestige | 18 (51.43) | 27 (60.00) | 38 (47.5) | 16 (45.7) | 21 (48.9) | 45 (56.2) | 42 (52.5) |
| Standard of living/ Comfortable life | 35 (100) | 39 (66.70) | 80 (100) | 35 (100) | 45 (100) | 76 (95.0) | 70 (87.5) |
| Enjoying recreational facilities (TV, etc.) | 25 (71.40) | 31 (68.0) | 59 73.7 | 30 (85.7) | 36 (80.0) | 66 (82.5) | 64 (80.0) |
| Modern appliances – fridge, computer etc. | 35 (100) | 45 (100) | 80 (100) | 35 (100) | 45 (100) | 80 (100) | 80 (100) |
| Cheaper than oil | 35 (100) | 45 (100) | 80 (100) | 35 (100) | 45 (100) | 80 (100) | 80 (100) |
| Safety | 26 (74.26) | 32 (71.10) | 69 (86.25) | 23 (65.7) | 30 (66.7) | 52 (35.0) | 51 (63.7) |
| **Total** | **171 (497.09)** | **219 (466.70)** | **406 (507.45)** | **174 (497.1)** | **222 (495.6)** | **399 (468.7)** | **387 (483.7)** |

NB: Column total exceeded by total number of households because more than one response by the same household.

In the table below, within the ESA, grid-connected HH in City Centre, Commercial Villages and Rural Settlements indicated their top reasons for wanting electricity were cheaper than fuel oil and then standard of living. Non-grid connected HH in City Centre within ESA indicated their top reasons were safety and then standard of living, whereas

non-grid connected HH in Commercial Villages and Rural Settlements within ESA, and HH outside ESA, indicated their top reasons were cheaper than oil and standard of living.

**Table 47: HH ranking of electricity reasons within and outside ESA**

| Response | **Households within ESA** (No. of households) | | | | | | | | | | | | **HHs outside ESA** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Grid-connected HHs** | | | | | | **HHs without grid-connection** | | | | | | | |
| | City Centers | | Commercial Villages | | Rural Settlements | | City Centers | | Commercial Villages | | Rural Settlements | | | |
| | Preferences | | Preferences | | Preferences | | Preferences | | Preferences | | Preferences | | Preferences | |
| | 1st | 2nd | 1st | 2nd | 1st | 2nd | 1st | 2nd | 1st | 2nd | 1st | 2nd | 1st | 2nd |
| Social prestige | 2 (5.7) | 5 (14.3) | 4 (8.9) | 9 (20.0) | 6 (7.5) | 12 (15.0) | 7 (20.0) | 5 (14.3) | 5 (11.1) | 6 (13.3) | 15 (18.7) | 12 (15.0) | 14 (17.5) | 9 (11.3) |
| Standard of living | 5 (14.3) | 15 (42.9) | 8 (17.8) | 18 (40.0) | 14 (17.5) | 32 (40.0) | 10 (28.6) | 13 (37.1) | 10 (22.2) | 19 (42.3) | 16 (20.0) | 32 (40.0) | 20 (25.0) | 32 (40.0) |
| Recreation facilities | - | 3 (8.6) | - | 5 (11.1) | - | 8 (10.0) | - | 3 (8.6) | - | 5 (11.1) | | 6 (7.5) | - | 6 (7.5) |
| Modern appliances | - | 3 (8.6) | - | 3 (6.7) | - | 7 (8.7) | - | 6 (17.1) | 2 (4.4) | 6 (13.3) | 6 (7.5) | 14 (17.5) | 3 (3.7) | 13 (16.2) |
| Cheaper than oil | 23 (65.7) | 4 (11.3) | 26 (57.6) | 5 (11.1) | 47 (58.7) | 8 (10.0) | 7 (20.0) | 5 (14.3) | 20 (44.4) | 5 (11.1) | 23 (28.8) | 11 (13.7) | 23 (28.8) | 13 (16.2) |
| Safety | 5 (14.3) | 5 (14.3) | 7 (15.7) | 5 (11.1) | 13 (16.3) | 13 (16.3) | 11 (31.4) | 3 (8.6) | 8 (17.9) | 4 (8.9) | 20 (25.0) | 5 (6.3) | 20 (25.0) | 7 (8.8) |
| **Total** | **35 (100)** | **35 (100)** | **45 (100)** | **45 (100)** | **80 (100)** | **80 (100)** | **35 (100)** | **35 (100)** | **45 (100)** | **45 (100)** | **80 (100)** | **80 (100)** | **80 (100)** | **80 (100)** |

NB: Figures in the parentheses indicate percentages of column total

## *5.2.16 Dissatisfaction with Electrical Utility*

In the table below, 77% of grid-connected HH in City center, 82% in commercial villages and 75% in rural settlements reported that they were <u>not</u> satisfied with DABS.

**Table 48: Grid-Connected HH satisfaction with electrical utility**

| **Responses** | **Grid-connected households** (No. of Households) | | |
|---|---|---|---|
| | City Centers | Commercial Villages | Rural Settlements |
| Yes | 9 (22.86) | 8 (17.77) | 2 (25.00) |
| No | 26 (77.14) | 37 (82.23) | 78 (75.00) |
| **Total** | **35 (100)** | **45 (100)** | **80 (100)** |

In the table below, respondents provided some reasons to explain their dissatisfaction with DABS and suggested actions to remedy the situation. Their discontent emanated from bribery, preferential treatment for rich and powerful, and irregular supply due to rationing. Solutions included more transparency to eliminate corruption, more rigorous enforcement and collections, setting priorities/targeting of available electricity, and a less complex connection process.

**Table 49: Reasons for grid-connected HH dissatisfaction with DABS**

| Grid-connected HHs within ESA | Reasons behind dissatisfaction | Suggestions by HHs |
|---|---|---|
| City Centers | ▪ Not enough to meet requirements<br>▪ Less electricity caused innumerable sufferings<br>▪ Service and delivery system is corrupt<br>▪ Power distribution done in an unfair way<br>▪ Billing system unfair, some are getting free.<br>▪ Less trust on government people. | ▪ Ease the process in getting power<br>▪ Establish transparent system<br>▪ Ensure electricity for 24 hours<br>▪ Priority in agriculture and industry<br>▪ Remove corrupt official |
| Commercial Villages | ▪ Sometime, no electricity for months and months<br>▪ No electricity all days of the week<br>▪ No power is for 24hours<br>▪ Affects our works and education of children<br>▪ Less electricity caused innumerable sufferings<br>▪ Corrupt billing system | ▪ Ensure electricity for 24 hours<br>▪ Ease process of getting electricity<br>▪ Remove corrupt official<br>▪ Reduce paper process during registration<br>▪ Establish transparent system |
| Rural settlements | ▪ Have connection but almost no electricity<br>▪ Powerful people get grid-power easily<br>▪ Few hours electricity in a week<br>▪ Irregular power supply affecting us. | ▪ Increase electricity for 24 hours<br>▪ Bring down price per kwh<br>▪ Ease the process of getting power<br>▪ Remove corrupt official |

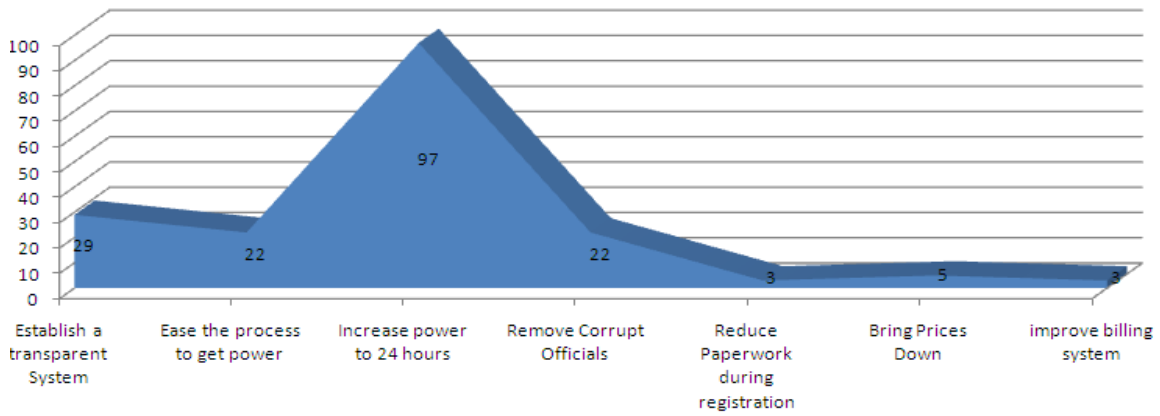
## 5.3 Continuing Problems and Constraints of Grid Electrification in ESA

### *5.3.1 Problems of grid electricity supply in the 'south'*

The perceptions of various stakeholders and beneficiaries [end-users] were sought on the continuing problems and constraints in electricity supply in the ESA. Their opinions, observations and comments were gathered through a] consultative meetings in Kabul and b] individual and focus group meetings in the field [Kandahar, Lashkar Gah and Kajaki] using the most suitable 'key informant' guide.

***Despite noticeable improvements in power supply from 2003-2009, inhabitants of the five study districts still lack access to reliable and affordable public electricity.***

**Graph 2: Consumer Dissatisfaction with DABS**



There are multiple problems including:

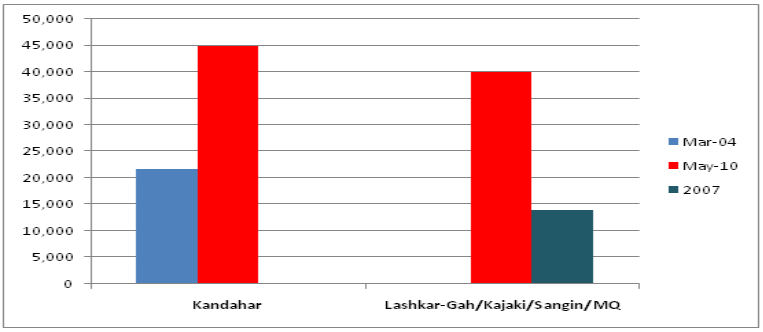
- Ongoing chronic shortages in on-grid electivity supply and the resulting 'brownouts' or load-shedding severely disrupt peoples' working lives and detract from their quality of life. Inconsistent and irregular electricity causing annoyance, inconvenience and frustration for all customers. Unreliable on-grid electricity supply makes it very difficult to manufacture goods.
- Available electricity is not distributed fairly with more privileged persons receiving a larger share.
- Voltage swings are common and have been known to go as high as 380 volts causing damage to machinery and equipment, and home appliances.
- Because of load-shedding, residents turn to diesel generators out of necessity even though they cannot afford the high cost of fuel.
- Procedures for applying for a new connection can be onerous and costly, and applicants are likely to encounter request for unofficial payments.
- A significant amount of power is stolen through illegal connections thereby depriving normal customers of much-needed electricity, and the electrical utility of much-needed revenue.
- Due to inefficiencies and poor management, many customers are not billed, and many that do not pay do not encounter any collection effort by DABS.

### *5.3.2 Constraints of grid electricity supply in the 'south'*

There are many prevailing constraints on the electricity supply system:

- Constraints on supply side - limited generation capacity, limited capacity of transmission lines and limits of distribution system.
- On demand side demand for electricity far outstrips supply - demand has raced ahead with customers more than doubling same period.[69]

**Chart 2: Increasing Customers/Connections in ESA**




[69] About 88% of connections are residential, 10% commercial and remaining 2% institutional/religious. In Helmand, according to DABS, connections almost evenly split between the four districts.

- High population growth and in-migration of economic and conflict refugees resulting in high growth of connections diluting additional power made available.
- Poor infrastructure – huge system losses due to aging.
- Current transmission line from Kajaki Dam to Kandahar and Lashkar Gah is 110V that limits the carrying load to 22MW.
- Sabotage to transmission facilities – downed towers and lines cut by insurgents.
- Insufficient financing for system expansion and modernization.

**Photo 16: Dilapidated Distribution Equipment and Uncontrolled Connections**

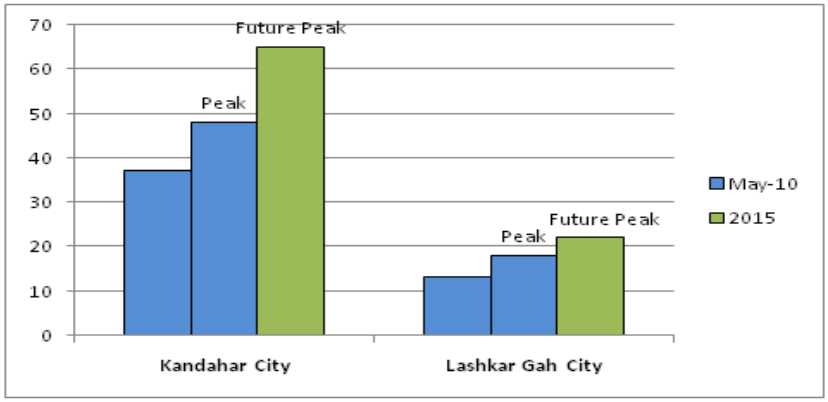
- Lack of trained personnel at DABS such as engineers, managers etc.

**Photo 17: L-G Transformer Awaiting Installation and Kajaki Transmission Line Entering Kandahar**

- Weak government policies.
- revenues fall far short of costs – do not cover operating nor capital expense
    - Failure of State utility DABS to bill and collect from consumers [theft and 'free riding']
    - Very expensive diesel generators
    - Low tariffs
- Flat rate charges – no incentive to cut consumption

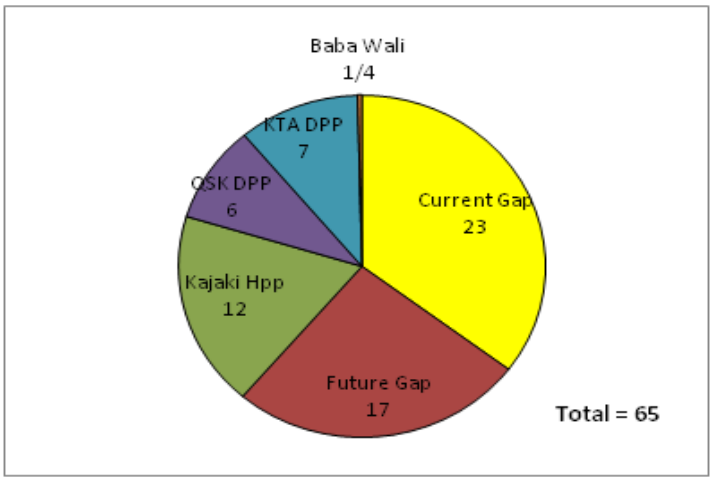
And demand is forecast to continue growing strongly in the near future – to peak 65MW in Kandahar and 22MW in Lashkar Gar City [let alone 3 northern districts in Helmand] based on existing, suppressed and emergent market segments.

**Chart 3: Increasing demand for Electricity in ESA**




This has inevitably led to a serious gap between supply and demand in the ESA, and the shortage will continue to grow unless efforts are made to increase supply now. The current gap in Kandahar City/District is estimated to be 23MW and the future gap to 2015 to be an additional 17MW i.e. a total of 40MW.

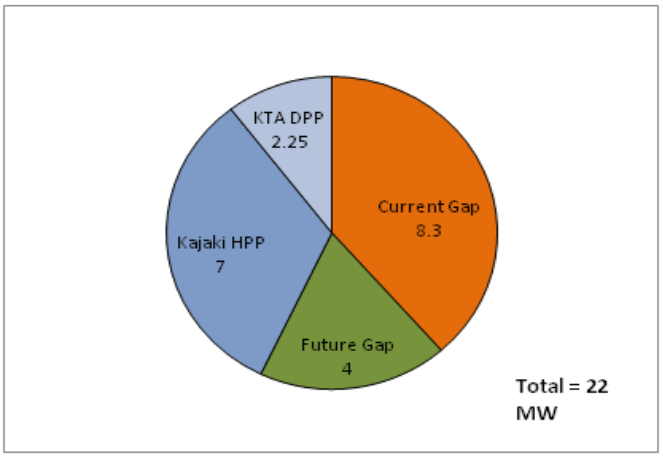
**Chart 4: Kandahar City/District Electricity Supply Shortage**




For Lashkar Gah City[70], the current gap is estimated to be 8.3MW and the future gap to 2015 to be an additional 4MW i.e. a total of 12.3MW.

[70] Not possible at this time to obtain data on gap in Sangin/kajaki/Musa Qala districrts.

**Chart 5:Lashkar Gah Electricity Supply Shortage**



## 6.0 CONCLUSIONS & RECOMMENDATIONS

Based on the Study Team's findings in the previous section, this section makes recommendations on:

- improving **existing electrification** in the ESA – technical and commercial solutions;
- improving **similar future projects** in the ESA – lessons learned and strategic challenges.

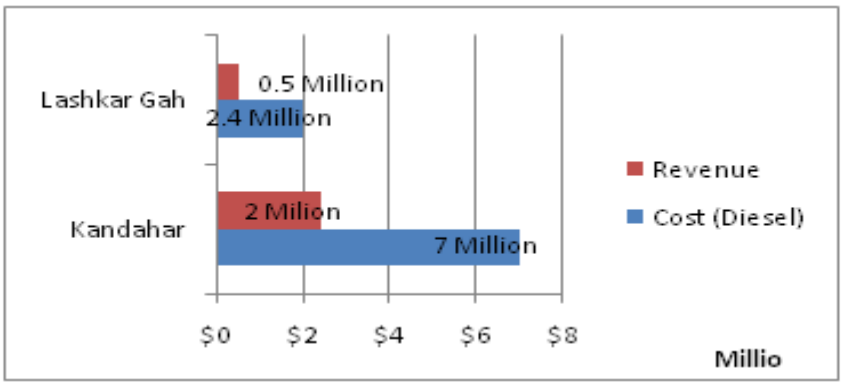
## 6.1 Improving Existing Electrification in the ESA

There is undoubtedly serious power shortage of public electricity in the ESA but the question becomes how best to power the 'south'?

A good place to start is to look at the strategic options.

- Fossil fuels
  - No gas, oil in south, and SEPS not linked to NEPS to access cheap imported power.
  - Diesel is costly for operating, unaffordable, and diesel supply routes are not stable.

**Chart 6: DABS Subsidy in ESA**




  - Diesel is not a sustainable solution for the long-term but as a shot term option may provide a 'quick fix'.
- Renewable
  - Wind potential in West, and to a lesser degree in the North
  - Biogas – extremely limited
  - Solar – lots sunshine but high capital cost, O&M high-level, may be more appropriate for small scale, in remote, rural areas [SHS]
  - Hydro – cheap, clean,
    - micro-hydro – useful especially in remote, rural but potential mostly north
    - mega projects HPP but big investments and time horizon e.g. 2nd phase Kajaki Dam/HPP

- import
    - cheap from several neighboring countries – prefer north as seen as more reliable and population pressures in Pakistan may soon require all homegrown power.
    - but need to link SEPS to NEPS – expensive infrastructure [transmission lines]

### *6.1.1 Energy Supply Options for Kandahar*

USAID is to direct the majority of its aid resources this year on Kandahar, and much of that will focus on infrastructure especially power. CIDA is also a major donor in this area.

The below shows all potential additional generation sources that may be applied to Kandahar City:

**Table 50: Future Possible Power Supply Sources for Kandahar City/District**

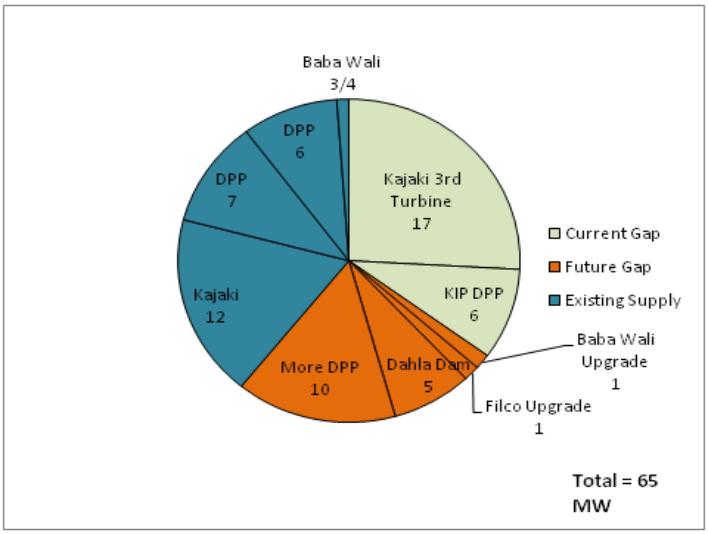
| **Generation source** | **Potential additional generation capacity** | **Est. time of completion** | **comments** |
|---|---|---|---|
| Kajaki Unti 2 [3rd turbine] | 18 MW | 18-24 months | Security issues - need road access for cement and est. cost $19m. with all going to Kandahar |
| Khnd Ind Park DPP | 6 MW | 9-12 months | Security |
| Baba Wali upgrade Hydro | 1 MW | 18 months | Security |
| Dahla Dam [2 micro HPP on irrigation canals] | 5 MW | 3-4 years | Under consideration by CIDA |
| Filkoh HPP | 1 MW | 18 months | Destroyed during war |
| More DPP | open | 12 – 18 months | High fuel costs 10x hydro – not sustainable |
| NEPS to SEPS | 30 MW | 30 months | High cost of infrastructure, then unreliable/vulnerable imported power |
| Kajaki phase 2 | 4 x 25MW | 4-5 years | Huge cost |
| **Total 'firm'** | **31 MW** | | |

The photos below shows the space at Kajaki HPP for the 3rd turbine and the various components for the 3rd turbine awaiting installation.

**Photo 18: Space for 3rd Turbine at Kajaki HPP and Stored Components Already on Site**

In the figure below, it shows Kandahar current gap can be met through Kajaki 3rd turbine though it will take 18-24 m to bring on line, and a 6MW DPP to be set up in the Kandahar Industrial Park. To account for growth in demand over the next five years, need to upgrade Baba Wali, Filcoh and Dahla, and establish another DPP of 10MW.

**Chart 7: Kandahar City/District Current and Future Electricity Supply MW**




Under this scenario, Kandahar would rely on diesel generators for 29MW of power of public electricity. The annual diesel bill [apart from repair, maintenance etc.] would be approx. $30 million annually i.e. for every MW about $1 million assuming the generators are operating at 75%. This is clearly not sustainable in long-run as the IROA simply cannot afford the fuel bill considering that the national budget is only a little over $ one billion. Long term options are: 2nd phase at Kajaki Dam/HPP and connect SEP to NEPS and import power. Former is huge capital cost perhaps $200 million and latter imported power not good for energy security.

### *6.1.2 Energy Supply Options for Lashkar Gah*

It is unclear at this time what potential additional generation sources may be applied to Lashkar Gah City as the aid focus seems to be on Kandahar. In energy planning for the 'south' there was no mention from USAID of additional diesel gensets for Lashkar Gah or connecting SEPS to NEPS [and imported power] in the foreseeable future.

In the south, ADB is taking an energy initiative with DfID, DANIDA and JICA funds. A USD 70 million tender is being launched to rehabilitate Grishk HPP but this power will only benefit the 8,000 households in Grishk as this energy facility is not connected to SEPS[71].

The table below shows all potential additional generation sources that may be applied to Lashkar Gah City:

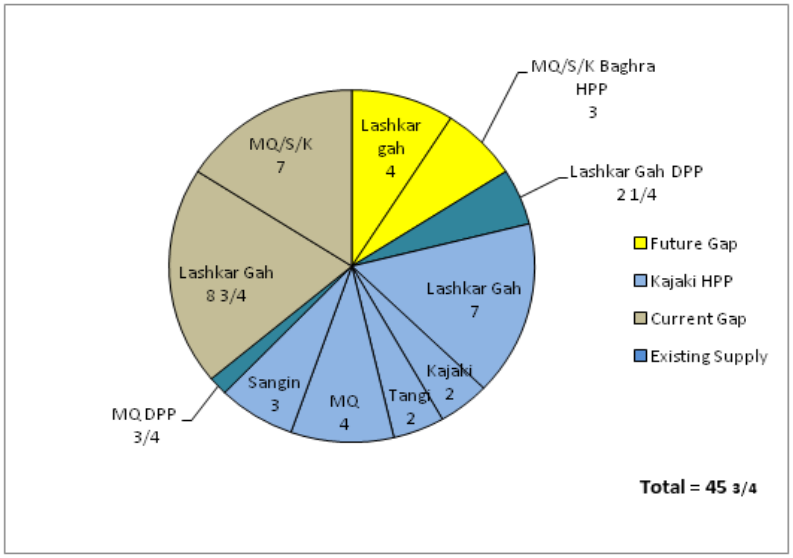
**Table 51: Future Possible Power Supply Sources for Lashkar Gah City**

| **Generation source** | **Potential additional generation capacity** | **Est. time of completion** | **comments** |
|---|---|---|---|
| Kajaki Unit 2 | 16.5 – 18 MW | 24 months with road access | Security issues |
| Kajaki 2nd HPP | 100MW | n/a | Huge cost and donors have no 'appetite' |
| Grishk HPP | 4.8 MW | n/a | ADB with DfID/Danida/JICA funds – power for Grishk only |
| Boghra Dam [13 micro HPPs on irrigation canals] | 3 MW | n/a | PRT promoting project – NSP implementation with DfID funds. At survey stage – no feasibility yet. |
| More Gensets | open | 12 – 18 months | High fuel costs 10x hydro – not sustainable |
| NEPS to SEPS | open | 30 months | High cost of infrastructure, then unreliable/vulnerable imported power |
| **Total 'firm'** | **3 MW** | | |

In the figure below, it shows current gap to be over 15MW and future gap [to 2015] to be 7MW. The Boghra micro HPPs could supply 3 MW leaving almost 20MW unmet.

[71] According to ADB, Japanese Aid has $5 billion earmarked for infrastructure development in Afghanistan but this was denied by JICA and Japanese Embassy representatives.

**Chart 8: Lashkar Gah/Sangin/Kajaki/Musa Qala Districts Current & Future Electricity Supply**




As per Kandahar, short-term solution is DPP but very expensive diesel costs and vulnerable to disruption. Long-term solution is Kajaki 2nd phase or imported power through SEPS-NEPS link.

### *6.1.3 Recommendations*

- Increase <u>generation</u> capacity by:
    - One action that is strongly supported by all the stakeholders and beneficiaries consulted is to immediately install the 3rd turbine at Kajaki HPP with all 18MW going to Kandahar – although all the components are already on site, the required 350,000 tons of cement means securing the Sangin Valley to truck in the material or a much more expensive airlift[72] .
    - rehabilitating the existing generators to boost performance;
    - Although diesel generators are a very costly to operate[73], and therefore not sustainable in the long-run[74], and supply routes are vulnerable, additional gensets could provide immediate relief, especially if a new DPP was established in the Kandahar Industrial Park to enable light manufacturers to re-establish operations and re-hire workers.
    - CIDA has identified 2 locations for future micro-hydro on Dahla Dam irrigation canals capable of generating 4-5MW, in addition to upgrading Filcoh and Baba Wali hydro for about 1MW each;

[72] The cost of airlifting the estimated thousands of tonnes of cement required for Unit 2 as well as stones and sand, and a crushing machine, is considered prohibitive .
[73] Diesel generators consume 290 liters to produce one MWh.
[74] Kandahar diesel gensets use 30,000 liters daily costing about $7-9 million annually.

- The Grishk Dam could yield 4.8MW after upgrade but solely for Grishk.
- DfID may fund 13 micro hydro sites on Boghra irrigation canals yielding 3MW.
- developing Kajaki Dam phase 2 would yield an additional 100MW but building spillway gates to raise level of water, installing 4 turbines and increasing transmission capacity would be a massive investment over a long time frame, and donors unlikely to have an appetite for this. What is suggested is to carry out a feasibility study [technical and financial] for adding a 2nd HPP at Kajaki including erecting 12 meter gates on the spillway to raise water level at Kajaki Dam.
- connecting SEPS to NEPS would enable relatively cheap imported power from neighboring countries to flow to the south but new transmission line is costly and long term, and would make the country more vulnerable in terms of energy security. Imported electricity is at the moment almost as cheap as hydro power and Afghanistan needs a national grid system in long-term to take advantage of alternate power sources. However, Afghanistan should develop its own power generation sources and not rely on imported power as makes the country dependent and vulnerable. There are indigenous sources of power such as coal and gas that could be offset to an extent by taking advantage of renewable potential [hydro] as well.
- the potential for renewables in Afghanistan is wind in the West and North, micro-hydro in the North and solar in the South, yet extreme hot and dusty conditions necessitate high-level operations and maintenance that severely restricts the wide application of solar - though in remote and rural areas off-grid household solar systems may be preferred to small diesel generators and more traditional energy sources.

- Reduce system losses through efficient transmission and distribution :
  - Upgrade the transmission line running from Kandahar-Kajaki-Lashkar Gah would mean replacing over 1,000 unsteady towers and the line itself to be able to carry 220 volts;
  - Upgrade electrical distribution systems [transformers, substation, and feeder lines].

***Off-grid electricity***

Any off-grid measures would by necessity be long-term and at this time are not the least cost solution. But worthwhile to continue piloting various different small projects to test the new renewable technologies in the Afghanistan environment, and consider large-scale application once they are proven technically and the cost structure is more favorable. Solar home systems, solar street lighting and solar lamps are well suited to South and East where sunshine is in abundance. In remote rural areas where too expensive to extend the grid and/or connect households, look at decentralized systems such as solar.

***Energy Efficiency and Conservation***

Initiatives being considered by the ongoing USAID energy efficiency and conservation project ACEP in Kabul to optimize energy demand could be applied elsewhere e.g., long-life LED bulbs and pre-paid tariffs [flat rate charges encourage wasteful consumption].

## 6.2 Improving Future Similar Projects in the ESA

There are several important lessons to be learned from improvements made to electrical supply system during 2003-09 as follows:

- It is vital for country's development and stability that electricity supply keeps up with demand - not just more electricity but targeted power for example to promote economic development by providing power to commercial activities such as markets, bazaars and business parks, and to water pumps for irrigation schemes.
- Electricity can radically transform people's lives and livelihoods – electricity not only improves standards of living and quality of life but also is a powerful force for modernization and poverty reduction. The lack of access to electricity is holding back development in all sectors of the economy. As in Iraq, "where there is no light, there is no State', having the 'lights on' in Afghanistan is seen as a proxy for progress.
- It is very expensive and difficult if not impossible to develop and maintain energy infrastructure in a conflict situation – security is therefore vital. There is a need to address a surge in efforts by the Taliban to disrupt power supply and a surge in local population as evidenced by growth of connections. When asked if people were better or worse off now, respondents did not compare to Taliban days but to the 'glory days' of 2003-05 when the situation was positive and moving forward.
- People are increasingly disillusioned with IROA and ISAF, and fearful of Taliban who intimidate them constantly. It is essential that Afghan government "deliver" public services and the most important is electricity. Cultivating local support is key to diminishing the 'opposition'.
- However, a real dichotomy or tension exists between short-term military counter-insurgency imperatives [deliver on basic services such as electricity to shift support from Taliban to government] and longer-term sustainable development. Diesel generators may be a 'quick fix' but the cost of diesel fuel is exorbitant and supply routes highly vulnerable.
- Urgent need to build capacity of DABS through enhanced policies, systems, manuals, training etc., so it can be more effective with respect to addressing 'leakages' i.e. take strong action on billings, collections and 'theft'.
- Another need is to strengthen the legal and regulatory environment governing the energy sector in Afghanistan.
- An Energy Sector Strategy exists on paper but despite some sharing of information, there is no real donor coordination regarding improving electricity supply. USAID,

CIDA, DfID and ADB are engaged in energy projects in the south while others such as GTZ/KfW, World Bank and JICA support energy initiatives elsewhere in the country where the security threat is more manageable.

- Electricity is the only public service in Afghanistan that charges so a tariff structure that covers operating and capital costs would move DABS toward financial sustainability. Funds are essential to invest in necessary upgrading and expansion of energy infrastructure.
- Efforts to build the energy infrastructure are also contributing to poverty reduction. Greater operating efficiencies at electricity generation assets will release public resources for social programming and end-user efficiency will release consumer income for alternate expenditures; improved sector governance will better target subsidies; rural electrification will facilitate income generating activities for the rural poor; and economic growth will in general 'be a rising tide that lifts all boats'.

  As half billion dollars is likely to be committed by USAID [and possibly more by other donors] in major SEPS upgrade and expansion this coming year, this report should also serve as a useful baseline for future impact studies.

# ANNEX A: SCOPE OF WORK

# KHANDAHAR AND LASHKAR GAH ELECTRICAL SUPPLY SOCIO-ECONOMIC IMPACT ASSESSMENT

## SCOPE OF WORK

### A. INTRODUCTION:

In 1953, U.S. government funds built Kajaki dam to provide irrigation in the Helmand River Valley. During the mid-1970s, USAID installed the hydropower plant (HPP) with two 16.5 MW turbine generators at the foot of the dam. The units were called units 1 and 3, with a space between them for a planned third turbine generator unit 2. The units deteriorated during the twenty-five years of neglect after the Soviet invasion and subsequent Taliban regime. In 2003 USAID launched a rehabilitation program and refurbished unit 1 and unit 3 of Kajaki HPP.

Before the initiation of rehabilitation of Kajaki HPP, unit 1 and 3 were generating 4 MW and 12 MW respectively. This total 16 MW power was dispatched as follows:

1. Kandahar sub-station (SS) = 6 MW
2. Lashkar Gah SS = 2 MW
3. Sangin SS = 2 MW
4. Tangi SS (Kajaki & Musa Qala District) = 6 MW

After the rehabilitation of Unit 1(16.5 MW) on September 12, 2005, total generating capacity from unit 1 and 3 enhanced to 28.5 MW. The power was then dispatched as follows:

1. Kandahar SS = 10 MW
2. Lashkar Gah = 7 MW
3. Sangin SS = 3.5 MW
4. Tangi SS (Kajaki & Musa Qala District) = 8 MW

After rehabilitation of unit 3 on October 4, 2009, total generating power enhanced to 31.5 MW. This included 16.5 MW from unit 1 and 15 MW from unit 3. Since October 2006 the power dispatch stands at:

1. Kandahar SS = 12 MW

2. Lashkar Gah = 7.5 MW
3. Sangin SS = 3.2 MW
4. Tangi SS (Kajaki & Musa Qala District) = 8.8 MW

Table1 illustrates the incremental evolution of Power Generation and Dispatch from Kajaki Hydro Power Plant (HPP).

**Table –1: Power Generation and Dispatch from Kajaki HPPs**

| | **Before Rehab** (prior to 09/12/05) | **After Rehab Unit 1** (after 09/12/05) | **After Rehab Unit 3** (after 10/04/09) |
|---|---|---|---|
| **GENERATION** | | | |
| Unit 1 | 4.0 MW | 16.5 MW | 16.5 MW |
| Unit 3 | 12.0 MW | 12.0 MW | 15.0 MW |
| Total | 16.0 MW | 28.5 MW | 31.5 MW |
| | | | |
| **DISPATCH** | | | |
| KANDAHAR Sub-Station | 6.0 MW | 10.0 MW | 12.0 MW |
| LASHKAR GAH Sub-Station | 2.0 MW | 7.0 MW | 7.5 MW |
| SANGIN Sub-Station | 2.0 MW | 3.5 MW | 3.2 MW |
| TANGI Sub-station (Kajaki & Musa Qala Districts) | 6.0 MW | 8.0 MW | 8.8 MW |
| Total Dispatch | 16.0 MW | 28.5 MW | 31.5 MW |

Hydropower is Afghanistan's cheapest source of electricity, and Afghan leaders have made many public calls for more hydro facilities, and the Kajaki dam capitalizes on this natural source.

In addition to upgrading the Kajaki Hydro Power Plant, USAID procured and installed 19 diesel generators in Kandahar and 3 diesel generators in Lashkar Gah. (USAID also funded a sub-station in Lash Gah for improving local distribution.)

## B. BACKGROUND:

The Kajaki upgraded hydro power plant is now serving more than 1.7 million residents of Kajaki, Tangi, Musa Qala, Sangin, and Lashkar Gah of Helmand Province, and Kandahar city of Kandahar province. Kandahar city has the biggest population center of nearly one million people. Lashkar Gah, which is the capital and biggest city of Helmand province, has a population

of about 700,000. These two major cities of 1.7 million residents along with other population centers such as Kajaki, Musa Qala, Tangi, and Sangin have been benefitted by remarkable improvement in hydro power.

**Kandahar Power Configuration:**

Kandahar receives electricity from two separate generation sources. Kandahar substation (Breshna Kot) is located at the center of Kandahar city, and receives 110 kV electricity from Kajaki HPP through a 177- kilometer South East Power System (SEPS) transmission line. The 110 kV is stepped down to 20 kV at Kandahar substation. The 20kV is connected to the 20 KV bus-bar at the substation.

Diesel generators are used as a second source to produce electricity in Kandahar. In November 2003, USAID installed 14 diesel generators at Kandahar substation. In November 2008, USAID provided logistics and installation of additional five (5) diesel generators of DABS (the Afghanistan Breshna Shirkat) in the same substation to further increase the power supply in Kandahar.

The installation details of these diesel generators in Kandahar are given below:

1. Fourteen (14) diesel generators (each with an installed capacity of 850 KW) of KTA were installed/commissioned on November 1, 2003 in Kandahar. Two (2) out of 14 installed generators of KTA50 are normally off to be used for maintenance and breakages.
2. Five (5) DABS diesel generators (each with an installed capacity of 1760 KW) of QSK were transported from Kabul, installed, and commissioned in Kandahar on November 1, 2008.

Kandahar substation has a 20 KV bus bar, which has three incoming and seven outgoing feeders. One of the three incoming feeders is currently receiving 10 to 12 MW power supply from Kajaki HPP and disburses it through the 3 outgoing feeders. The second incoming feeder usually receives 8 MW at 24 hours basis from 12 KTA gensets and disburses this power through 2 outgoing feeders. The third incoming feeder receives 6 to 7 MW from 6 to 15 hours daily from the 5 QSK gensets and dispatches it through the 2 outgoing feeders.

Each of the seven output feeders can carry a maximum load of 5 MW. Thus a total load of 35 MW can be carried by the output feeders. At present, these output feeders are carrying 26 MW, which includes 12 MW from Kajaki HPP and about 14 MW from the diesel gensets. The seven outgoing feeders through step-down distribution transformers provide electricity to the following customers: residential, commercial, industrial, government, and holy places.

**Lashkar Gah Power Configuration:**

At present Lashkar Gah sub-station is receiving 7 to 7.5 MW power from 130 kilometers long 110 kV SEPS transmission line from Kajaki HPP.

In addition, on April 1, 2004 USAID installed three (3) KTA diesel generators (each with an installed capacity of 850 KW) in Lashkar Gah. These generators normally operate at 75% of their installed capacity, and generate about 2 MW. The generators normally run 8 to 10 hours daily.

## C SCOPE OF WORK:

The purpose of this activity is to obtain a systematic assessment of social and economic impacts of the electrical supply improvements described above. USAID wishes to receive feedback from all groups of intended beneficiaries from the improvement in electricity supply due to rehabilitation of unit 1 and 3 at Kajaki Hydro Power Plant and installation of the diesel power generation sets.

The stakeholders, both at Kandahar and Lashkar Gah, will comprise average citizens, community leaders, farmers, shopkeepers, businessmen, industrialists, officials of law enforcement agencies, students and staff at schools/colleges/ universities, clinics and main hospitals, women who fetch drinking water for their families, local PRTs, DABS officials, NGOs, high officials from local and central government, including Governors of Kandahar and Helmand.

## C.1 METHODOLOGY / WORK REQUIREMENTS:

The assessment shall be based on ***quantitative*** and ***qualitative*** measures.

The assessment shall be based on ***power supply*** and ***socio-economic impact*** measures.

***A. Power Supply Measures***

**Power supply measures will include, for example:**

*i. Differences in available power supply* ***due to upgrading of Kajaki Hydro Power Plant****:*

- The difference in KWh generated for Kandahar and Lashkar Gah before and after the rehabilitation of unit 1 (16.5MW) on 12 September 2005.
- The difference in KWh generated for Kandahar and Lashkar Gah before and after the rehabilitation of unit 3 (16.5 MW) on 4 October 2009.
- The difference between number of hours of electricity rationing in Kandahar and Lashkar Gah before and after the rehabilitation of unit 1 on 12 September 2005.
- The difference between number of hours of electricity rationing in Kandahar and Lashkar Gah before and after the rehabilitation of unit 3 on 04 October 2009.

*ii. Differences in available power supply* ***due to installation of diesel gensets*** *by measuring:*

- The difference in KWh energy generation Kandahar had before and after the installation of fourteen (14) KTA50 diesel generators on November 1, 2003.
- The difference in KWh energy generation Lashkar Gah had before and after the installation of three (3) KTA50 diesel generators on April 1, 2004.
- The difference in KWh Kandahar had before and after the installation of five (5) DABS diesel generators of QSK60 on November 1, 2008.
- *iii.* Difference between (a) power supply <u>generated</u> at Kajaki and via installation of gensets and (b) power <u>available</u> to end-users.

***B. Socio-Economic Impact Measures:***

These measures will inform assessment of the improvement in economy and quality of life in Kandahar and Lashkar Gah due to improvement in electricity supply. A survey questionnaire complemented by qualitative methods (such as focus groups, community mapping, etc.) will record the impact of electricity provision by making comparisons of socio-economic conditions *before and after the rehabilitation of unit 1 &3 at Kajaki HPP and installation of diesel gensets*. Since baseline data on socio-economic conditions may be incomplete or non-existing, the assessment work plan may need to include retrospective reporting of power usage by stakeholders in order to capture some impacts.

Key indicators will include, for example:

- Availability of daily electrical power in hours.
- Increase in electricity consumption (KWhs).
- Methods of use of the additional KWhs. (For instance, students can be asked if the increased hours of electricity availability did help increasing their study hours). Additionally, it is anticipated that the increased availability of electricity may have resulted in increased sales of electrical appliances, longer working hours for commercial establishments, extended class times in schools, and encouragement to send girls to school.
- Observable and reported changes in routine functioning of life (for example, on methods of obtaining water for household use) due to increases in power supply and reduction in electricity rationing.
- Effect on small shops, businesses, industries, government offices, clinics, main hospitals, schools, colleges, and universities. (Main hospitals and government offices can be asked about [a] the difficulties they were facing before the improvement in electricity supply; and (b) the extent to which they are still experiencing any electricity rationing).
- Impacts on irrigation, agricultural practices and products (including crops), and agro-industry (including processing, storage and distribution).
- Hydro power costs significantly less than diesel-generated power, resulting in considerable savings in government fuel costs. With increased low-cost hydro power, local investment in small and large industries may increase, resulting in new job opportunities and consequent improvement in economic activities and the quality of life of all residents in Kandahar and Lashkar Gah. To the extent that such impacts are practicably measurable, the evaluation team is encouraged to gather relevant data to analyze them.
- Impacts on public health.
- Improvement (if any) in the local security situation due to additional lighting.
- Any reduction in crime rates, including theft, due to reduction in electricity rationing.
- Impacts on power users' perceptions of (a) quality of service delivery and (b) institutional sources of the improvements in available power supply. USAID recognizes that some of these prospective impacts (such as those on public health) may be difficult for the evaluation team to measure. A final list of impacts to be measured in the

evaluation will be determined after the team has explored the availability of relevant data and proposed its detailed methodology in its work plan.

The Evaluation Team will adopt the following approach information gathering:

**Interviews and in-depth discussions** with key stakeholders in the sector, including officials of concerned Ministry, Development Partners, Representative of the customer groups, etc.

**Inspection of Key Assets**, such as Rehabilitation unit 1 & 3 of Kajaki HPP, and selected diesel power generations stations in Kandahar and Lashkar Gah, and their substations, transmission and distribution lines, and consumer connections.

**Review of Documentations** including USAID and other development partners' reports and independent studies.

**Survey of Electricity Consumers –** There are four types of electricity consumers in general: Households, Agriculture (irrigation), Commerce and Industry (including service sector) . Accordingly survey will be divided into the following parts:

- **Household Survey**: A structured questionnaire survey for sample households, both for households having electricity connections (treatment households), and households having no electricity connections (control households) will be conducted.
- **Agriculture (Irrigation) Survey**: A survey of electrical pump users, diesel pump users and non- users of such technology will be carried out. This also follows a structured questionnaire survey.
- **Commerce and Industry (including service sector) Survey**: The diverse nature of the Commerce, Industry and Service sector consumers preclude the use of a standard questionnaire. Instead managers of several different types of commercial, and industrial businesses, and service units (including health services) will be interviewed informally, supported by some checklists.
- **Focus Group Discussions (FGD)**: The survey team will conduct focus group meetings with different social groups – farmers including pump users, village elites, commercial shop owners, industrialists, workers, and NGOs.

For **Resource Saving Assessment (**i.e. benefits due to cheaper alternatives available because of electrification compared to existing alternatives not involving electricity), some representative Commercial, Industrial and Service units and Households will be selected purposively.

The survey will also select potential consumers and assess their **Ability to Pay (ATP)** and **Willingness to Pay (WTP)** for electricity for new connections and electricity consumption.

***Preparatory Research and Interviews:*** The assessment team will be allocated preparatory research time on this assignment in advance of commencing its in-country work. This is to allow for the team to be fully ready, upon arrival in Afghanistan, to conduct informant interviews with representatives of USAID, the Government of the Islamic Republic of Afghanistan (GIRoA) and other sources. The team will also need to be prepared to specify requirements for a contracted survey scope of work (see below).

***Survey Approach:*** The assessment team will work with SUPPORT and USAID to develop a Request for Proposals (with its own Scope of Work) to subcontract through SUPPORT a local firm to implement the impact survey. Informed by review of relevant project documents and early in-country interviews, the team will finalize the survey subcontract SOW (featuring sampling method; data collection domains; data protocol design; data collection timetable; method of data aggregation, verification, and storage; and transfer of data to the assessment team) and will join SUPPORT leadership in selecting a preferred survey firm. The assessment team leader will supervise the performance of the contracted survey firm.

Questionnaires for key informant interviews, focus group discussions and other qualitative data collection methods will be agreed upon in the workplan. The interviews will be semi-structured around topics based on the position and particular relevance of the person(s) being interviewed.

Key informant and stakeholder questionnaires will include customized data collection instruments for: area residents, including average citizens; community leader; farmers; shopkeepers; officials of law enforcement agencies; students of schools, colleges and universities; staff of these institutions; staff of clinics or hospitals staff; business owners/managers; women fetching potable drinking water; local PRT staff; DABS officials; staff of NGOs; officials from local and central government; and the Governors of Kandahar and Helmand. Questionnaires or focus group moderator guides will be reviewed and approved by the USAID COTR before being administered in the field.

In developing its data collection instruments the assessment team will review previous USAID baseline socio-economic studies for guidance. The survey methodology to be employed shall include the universe of all the key stakeholders listed above, utilizing a random sampling method to capture a statistically reliable representation of the various types of stakeholders in Kandahar and Lashkar Gah.

**C2. DELIVERABLES AND DELIVERABLES SCHEDULE:**

- The assessment team will submit a Work Plan within five days of arrival in country. Upon USAID review and consultation with the team, the workplan will be revised as needed. USAID recognizes that the security environments in Helmand and Kandahar may necessitate some adjustments in data collection plans and schedules.
- A Final Report of not more than 30 pages excluding appendices shall include the following:
    - An executive summary, no longer than five (5) pages, that identifies and reports on the findings pertaining to above stakeholders perceptions.
    - Chapters or sections presenting (a) purpose of the evaluation; and (b) summary of the team's research method and operational schedule;
    - A detailed narrative and summary of findings disaggregated by gender wherever possible.
    - A chapter presenting assessment conclusions based on the team's findings;

- Specific recommendations addressing all concerns and/or problems identified through the field research, with special focus on ways in which future similar projects may be improved.

- The Appendices shall include:
  - This SOW;
  - A detailed description of the assessment methodology, including survey approach;
  - Display examples of questionnaires.
  - A list of key informants interviewed.
- The Team shall submit no less than 10 calendars days prior to departure from Afghanistan a draft final report describing the purpose of the consultancy, progress made, any observations to be shared, issues identified and/or problems encountered, recommendations and expected follow up work. USAID will review the draft final report within five (5) days and submit comments to the Team Leader for incorporation into the final report. The final report shall be submitted before the Team Leader's departure from Kabul.
- The team shall also present a PowerPoint presentation highlighting key findings to OIEE/USAID (joined by counterparts from the USG/ISAF Infrastructure Working Group and the GIRoA Interministerial Committee on Energy) 5-10 days prior to the Team's departure or as identified below in consultation with the USAID/OIEE COTR.

**C3. ESTIMATED LEVEL OF EFFORT (LOE):**

| **Position** | **Preparation Days** | **Travel Days** | **Days LOE in Country** | **Travel Days** | **Total** |
|---|---|---|---|---|---|
| Team Leader /Expat (1) | 5 | 2 | 48 days | 2 | **57** |
| Expat | 4 | 2 | 48 days | 2 | **56** |
| CCN (2) | | | 45 days each = 90 | | **90** |
| **Total LOE** | **9** | **4** | **186 days** | **4** | **203 days** |

**C4. CALENDAR SCHEDULE:**

The international consultants for the assessment team are expected to commence work on the assignment (beginning with approximately one week of document review and design/work plan preparation) in mid-April, 2010, and to begin work in Afghanistan on or about 18 April 2010. Completion of the assignment is expected in mid-June 2010.

**C5. QUALIFICATIONS OF KEY PERSONNEL:**

The Team Leader (Expat) would preferably be a socio-economist with at least 5 years of experience conducting field research in developing countries. The second international expert should have familiarity with energy consumption studies. It is preferred that one or both of the international consultants have experience or familiarity with methods of survey-based impact evaluation. Local consultant staff will be comprised of two Cooperating Country Nationals (CCNs). One CCN in addition to his qualifications should have good communication and translation skills. The other CCN should be a data analyst who will compile, evaluate, and analyze the gathered information and data.

## ANNEX B: WORK SCHEDULE

**Socio-Economic Impact Assessment of Electrification in Kandahar and Lashkar-Gah**

**SUPPORT Project**

**Checchi Consulting Afghanistan**

## ACTIVITY SCHEDULE

| Phase | Taskwork Description | Week | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | May | | | | June | | | | | July | |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1 | Draft SOW and engage local survey firm | | | | | | | | | | | |
| | Conduct scoping survey | | | | | | | | | | | |
| | Compile scoping data and propose settlements | | | | | | | | | | | |
| 2 | Orientation & initial briefings Study Team | | | | | | | | | | | |
| | Draft detailed workplan for assignment | | | | | | | | | | | |
| | Discuss/agree workplan with USAID | | | | | | | | | | | |
| 3 | Draft customised survey instruments & translate Pashto | | | | | | | | | | | |
| | Draft interview guides [semi-structured] | | | | | | | | | | | |
| | Discuss/agree questionnaires & guides with USAID | | | | | | | | | | | |
| 4 | Identify key informants/stakeholders | | | | | | | | | | | |
| | Meet/interview key stakeholders Kabul | | | | | | | | | | | |
| 5 | Literature review and synthesis - secondary sources | | | | | | | | | | | |
| 6 | Plan field visits to Kandahar & Helmand | | | | | | | | | | | |
| | Field Visit - Kandahar | | | | | | | | | | | |
| | Field Visit - Lashkar-Gah and the Dam | | | | | | | | | | | |
| 7 | Survey firm train enumerators and supervisors | | | | | | | | | | | |
| | Survey selected settlements | | | | | | | | | | | |
| | Reporting on surveys [raw data and text] | | | | | | | | | | | |
| 8 | Analyze data and information | | | | | | | | | | | |
| | Verify findings with government officials and experts | | | | | | | | | | | |
| | formulate conclusion and recommendations | | | | | | | | | | | |
| 9 | draft report and submit to USAID for review | | | | | | | | | | | |
| | make PowerPoint presentation to stakeholders | | | | | | | | | | | |
| | incorporate comments and submit final report | | | | | | | | | | | |

## ANNEX C: DAILY TASK RECORD

| DAILY TASK RECORD | | |
|---|---|---|
| **Day** | **May** | **Main Activities** |
| 1 | 15 | Travel to Dubai overnight |
| 2 | 16 | Travel Dubai to Kabul |
| 3 | 17 | Orientation by CoP. Settle in guesthouse. Briefing at USAID. |
| 4 | 18 | Establish office for study team. Orient support staff. |
| 5 | 19 | Planning meeting study team. Briefing with CoP. |
| 6 | 20 | Meet Ministry of Health officials. Draft workplan, survey instruments and Field Visit plan. |
| | 21 | Off |
| 7 | 22 | Discuss WP with CoP. Arrange for maps of ESA – electrical system and population. |
| 8 | 23 | Meet survey co. SDLR re scoping results. Re-draft survey instruments. Meet Louis-Berger rep. |
| 9 | 24 | Mete Ministry Energy officials, obtain documents, visit and meet Afghan Energy Info. Centre |
| 10 | 25 | Discuss field visit with security firm. Attend SDLR training session. Draft final report outline. |
| 11 | 26 | Draft excel sheets SDLR data encoders. Meet USAID re workplan. Re-draft field trip itinerary. |
| 12 | 27 | Re-draft questionnaires based on USAID comments. Discuss changes SDLR. |
| | 28 | Off |
| 13 | 29 | Plan/confirm travel logistics to Dam. Meet Ministry Agriculture senior officials. |
| 14 | 30 | Visit USAID 'green energy' project. Fine-tune survey instruments. |
| 15 | 31 | Discuss arrangements for field visit next week – travel, accom. Security. |
| 16 | June 1 | Fly to Kajaki Dam via LBG heli & inspect facility. Meet technical staff and discuss operations. |
| 17 | 2 | Plan/confirm field contacts and alert to possible visit. Follow-up SDLR. |
| 18 | 3 | Meet Sustainable Energy Services Afghan SESA. Review background documents. |
| | 4 | 0ff |
| 19 | 5 | Review encoder sheets. Set appts. June. Drafting report 'background. |
| 20 | 6 | Travel to Kandahar. Meet CoP at Global GH. Go to Watan GH and make calls/appointments |
| 21 | 7 | Call J. Huddlestone AID-KAF. Meet DABS and tour assets. Meet Education Ministry. |
| 22 | 8 | Chamber Focus Group 20 industrialists. Tour Industrial Park and Cold Storage. Monitor SDLR Coord/Supervisor. |
| 23 | 9 | Governor. PRT meeting. Agriculture Ministry. DABS 2nd time. |
| 24 | 10 | Health Ministry and tour health centre and clinic. Brief tel. survey FG industrialists. Tel KAF. |
| | 11 | Off |
| 25 | 12 | Travel to Lashkar-Gah. Meet Health. |
| 26 | 13 | PRT. DABS. |
| 27 | 14 | Fly Lash – Kandahar. Stay Global GH. |
| 28 | 15 | Meet AID D. Bailey. Fly Kandahar – Kabul on UNHAS. |
| 29 | 16 | National Solidarity Program. Afghan Investment Support Agency AISA, Chemonics CoP. |
| 30 | 17 | DfID contractor from Helmand. Hector Vivero FLAG.. GTZ micro--hydro mapping. |
| | 18 | Off |
| 31 | 19 | Robert Foster ACEP. V. McEtrick LBG-B&V. Review SDLR encoding progress. |
| 32 | 20 | Brief USAID on field visits. Digest background materials. Prepare for data analysis. |

| | | |
|---|---|---|
| 33 | 21 | Review survey data received from SDLR. Dummy tables. Verify energy data with DABS. |
| 34 | 22 | Review and insert maps and photos in report. Dummy tables. |
| 35 | 23 | Receive SDLR revised data. |
| 36 | 24 | Visit NSP/MRRD. Attend ICE meeting. Prepare tables from raw survey data. |
| | 25 | Off |
| 37 | 26 | Prepare tables from raw data. Consider implications of data. |
| 38 | 27 | Prepare tables from raw data. Consider implications of data |
| 39 | 28 | Review SDLR field survey report. Prepare graphs for report. |
| 40 | 29 | Time Sheet. Consider responses to open-ended questions. Prepare tables and analysis. |
| 41 | 30 | Prepare more charts and graphs. Insert more photos. Analyse tables. |
| 42 | July 1 | Draft report. |
| | 2 | Off |
| 43 | 3 | Draft report. |
| 44 | 4 | Draft report. |
| 45 | 5 | Submit final draft report to USAID |
| 46 | 6 | Prepare slides for PowerPoint presentation to stakeholders. |
| 47 | 7 | Refine draft report. |
| 48 | 8 | Refine draft report. |
| | 9 | Off |
| 49 | 10 | Present slides to USAID |
| 50 | 11 | Refine draft report |
| 51 | 12 | Refine draft report |
| 52 | 13 | Arrange for old papers to be shredded and documents stored. |
| 53 | 14 | Ensure Checchi has copy of draft report ‘soft’ and ‘hard’. |
| 54 | 15 | Time sheet. Submit report to USAID. Depart Kabul. |
| 55 | 16 | Travel to home base. |
| 56 | Aug 30 | Receive, review and discuss comments on draft report from USAID |
| 57 | 31 | Modify report |
| 58 | Sep 1 | Modify report |
| 59 | 2 | Modify report |
| 60 | 3 | Finalize report and submit |

## ANNEX D: MAIN DOCUMENTS REFERENCED

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- Provincial Rural Electrification Concept Paper. Afghanistan Energy program, renewable Energy Supply for Rural Areas [ESRA]. GTZ. Undated.

## ANNEX E: SURVEY QUESTIONNAIRES

| | |
|---|---|
| Set A1: | Electricity Connected Households within ESA |
| Set A2: | Non-electricity Connected Households within ESA |
| Set A3: | Households Outside ESA [control] |
| Set B1 : | Settlement Demographic Survey within ESA |
| Set B2: | Settlement Demographic Survey outside ESA [control] |
| Set C1-A: | Market Survey within ESA |
| Set C1- B: | Market Survey outside ESA [control] |
| Set C2 -A: | Shops/Industries/Commercial Units Survey within ESA |
| Set C2-B: | Shops/Industries/Commercial Units Survey outside ESA [control |

# OIEE Electrical Power Impact Assessment Study

## QUESTIONNARE, SET-A1
### HOUSEHOLDS WITHIN THE ELECTRICAL SERVICE AREA (ESA)
## ELECTRICITY CONNECTED HOUSEHOLDS

**Introduction:** We represent the Afghanistan Electrical Power Impact Assessment Survey effort. We would like to know how the current electrical power circumstances affect you. Your answers to these questions will guide us for future electrical power improvements. The information that you provide will be treated confidentially – no one will know what you told us because it will be combined with other people's information.

---

**A. GENERAL INFORMATION**

A.1 GPS Coordinates ----------, A.2 GEO Code ----------, A.3 Province --------

A.4 District ----------, A.5 Town/Village: ----------

**B. DEMOGRAPHIC AND SOCIO-ECONOMIC BACKGROUND**

B.1 Name of the Household Head: [optional ]----------

B.2: Age: --------- years

B.3: Male: ☐ **Female** ☐

B4:
Provide Information on Household Members:

| Sl No. | Items | Male | Female | Total |
|---|---|---|---|---|
| 01. | Family Members | | | |
| 02. | Children (less than 14 years) | | | |
| 03. | Income-earning members | | | |
| 04. | School-College-going members | | | |
| 05. | illiterate member (can not read & write) | | | |

B 5. What are the different occupations of your family members?

| Sl No. | Type of occupation | Male | Female | Total |
|---|---|---|---|---|
| 01. | Agricultural activity on own land | | | |
| 02. | Wage labourer | | | |
| 03. | Office job | | | |

| | | | | |
|---|---|---|---|---|
| 04. | Barber | | | |
| 05. | Metal worker | | | |
| 06. | Wood carpenter | | | |
| 07. | Bakeries | | | |
| 08. | Dentist/Dental technician | | | |
| 09. | Teachers | | | |
| 10. | Army | | | |
| 11. | Shop owners | | | |
| 12. | Restaurant business | | | |
| 13. | Any other (specify) | | | |

B.6. Provide Annual Household Income [or monthly then x 12]

| **Sl No** | **Source of income** | **Amount (afs)** |
|---|---|---|
| 01. | By selling agricultural output | |
| 02. | By selling own made goods or services | |
| 03. | By wage-earning/salary | |
| 04. | Any other (specify) | |

B.7. Do you think that your family income increased after you were connected to the grid [government line] ?

Yes ☐ No ☐

B.8. If yes, how much has your family income increased since grid connection? -------%

B.9. Specify how your family income increases after improvement of electricity supply:

Established a business ☐ More job opportunities ☐ Sold more ☐

Improved production ☐

Other (specify) ☐

B.10 Provide Annual Expenditure of your family [or ask for monthly then x 12]:

| SI | Items of Expenditure | Amount (afs) |
|---|---|---|
| 01. | Food items | |
| 02. | Clothing | |
| 03. | House rent (if any) | |
| 04. | Schooling and Education | |
| 05. | Doctor and Medicine | |
| 06. | Recreation and recreational items | |
| 07. | Transportation | |
| 08. | Energy/power incl Electricity | |
| 09. | Any other (Please specify) | |

## C. HOUSEHOLD CONSUMPTION OF ELECTRICITY

**C1** What are the different sources of your energy?

| | | |
|---|---|---|
| 01 | Kerosene [diesel] | |
| 02 | Dry cell battery | |
| 03 | Candles | |
| 04 | Car battery | |
| 05 | Generator - own | |
| 06 | Generator - community | |
| 07 | Generator – neighbor | |
| 08 | Generator - private | |
| 09 | Electricity from grid [government line] | |
| 10 | Fuel wood/lumber | |
| 11 | Solar | |
| 12 | Other – please specify | |

C.2 If you use your own generator, how many do you have? …….

C.3 How much did you pay for your generator? afs…….

C.4 Do you think the price you paid for the generator was;

Very high ☐ high ☐ ok ☐ cheap ☐

C.5 How much do you spend per month on average on fuel for your generator[s]? afs……

C.6 What type of fuel do you use in your generator[s]?

Diesel ☐ gasoline ☐

C.7 How much do you spend each month on average on other costs to operate your generator

i.e. labour, maintenance, oil etc.? afs……

C.8 How much do you spend annually on repairs for the generator[s] ? afs…….

C.9. In which year was your house connected to the grid [government electric line] ? ------

C.10 do you have an electric meter?

Yes ☐ no ☐

C.11. For what purpose do you use electrical energy?

Used exclusively for household purpose ☐

Used exclusively for business ☐

Mixed use (both for household and business) ☐

C.12. For household use, please indicate that electricity is used for which purposes?

Cooking ☐ heating ☐ light ☐ computer ☐

other [specify ……

C.13 How many electric bulbs do you use to light your house at any time?: ----------

C. 14. How many hours per day on average do you have electricity supply? :…. ----- hrs

C.15 How many days per month on average does your home receive electricity supply. …….days

C.16. Over the last 6 months, has the number of hours of electricity supply per day ?

Increased ☐ decreased ☐ remained the same ☐

C.17 What is your total electricity consumption per month on average: ----------kwh.

C.18. How much do you pay for electricity per month on average ? ----------(Afs)

C.19 How are you billed for your electricity consumption?

By KwH ☐ no. of appliances? ☐ Fixed monthly rate ☐

Other [please specify]……..

C.20. What % of your total energy cost goes to electricity from the grid? %…….

C.21 How much do you spend to buy electric bulbs per year? ---------- (afs)

C.22. If you use traditional sources of energy, , what is the fuel cost per month for traditional fuel [kerosene, wood, dung] ? …….. (Afs)

C.23. How much do you spend to buy traditional lamps per year ? ----------(Afs)

C. 24. Which of the following facilities that consume electricity are available in your house? State their current market value.

| **Sl.No.** | **Facilities** | **No.** | **year purchased or acquired** | **how much did you pay afs** |
|---|---|---|---|---|
| 01. | TV | | | |
| 02. | Radio | | | |
| 03. | Refrigerator/freezer | | | |
| 04. | Computer | | | |
| 05. | Cooker | | | |
| 06. | Iron | | | |
| 07. | Washing machine | | | |
| 08. | Fan | | | |
| 09. | Blender | | | |
| 10. | Sound equipment | | | |
| 11. | Pump for well | | | |
| 11.. | Any other (Please specify) | | | |
| | | | | |

C. 25 Which of the above appliances/items did you purchase/acquire AFTER you were connected to the grid?……

**D. IMPACT ON LIFE AND ECONOMY**

D.1. How many hours do male members in your family work (including households activities) after sun set?: ---------- hrs

D.2. Do you think that hours of work of male members at night have increased because of the electric lighting in comparison to traditional lighting such as candles?

Yes ☐ No ☐

D3. If yes, what is the average increased hours the male members work due to electric lighting? ---------- hrs

D4. How many hours female members in your family work (including households activities) after sun set?: ---------- hrs

D.5. Do you think that hours of work of female members at night have increased because of the electric lighting in comparison to traditional lighting?

Yes ☐ No ☐

D.6. If yes, what is the average increased hours the female members work due to electric lighting? ---------- hrs

D.7. With the onset of electricity, do your family members no longer have to fetch water?

Yes ☐ No ☐

D.8 If yes, how many hours per day are now saved due to water being locally available? …….hrs

D.9 How many hours do your children in your family spend on study each night? ------ hrs

D.10. Do you think that number of hours of study by your children at night have increased due to the improved electricity supply? ?

Yes ☐ No ☐

D.11. If yes, what is the average increased hours the children study at night due to electric lighting? -----hrs

D.12. Do your children spend more time learning at home since you were connected to the grid?

Yes ☐ No ☐

D. 13. Are your school-age girls going to school??

Yes ☐ No ☐

D.14. If you have a TV in your house, how much time per day does your family spend watching TV? –----- hrs

D.15. What is your perception about local health care services, now they have electrical power?

Accessibility to hospital and clinics [longer opening hours]:

Remains as before ☐, Increased ☐ Decreased ☐

D.16 Service delivery of the hospital and clinics:

As before ☐, Improved, but not significant ☐, improved significantly ☐

D.17. If you ticked the last box above, please describe in your own words the ways in which health services at the clinic or hospital have improved due to electricity

……

……

D.18 What is your perception about the security situation since there is now more electric lighting ?

As before ☐, Improved, but not significant ☐, improved significantly ☐

D.19. What is your perception about crime rates and theft due to electric lighting and/or reduction in electricity rationing?

As before ☐, Improved, but not significant ☐, improved significantly ☐

D. 20 Can you think of any other ways in which your routine functioning at home has changed since you were connected to the grid/

……

**E. PREFERENCES IN ELECTRICAL ENERGY CONSUMPTION**

E.1. Why do you want electricity connection at your house? Rank five items only
($1^{st}$ preference-1, $2^{nd}$ preference -2, $3^{rd}$ preference -3, $4^{th}$ preference-4, $5^{th}$ preference- 5)

| | Preference List | Preference rank |
|---|---|---|
| 01. | Social prestige | |
| 02. | Standard of living/comfortable life | |
| 03. | Enjoying recreational facilities (e.g. TV, etc) | |
| 04. | Modern instrument (e.g. Computer, refrigerator, etc) | |
| 05. | Cheaper than oil | |

| | | |
|---|---|---|
| 06. | Safety | |
| 07. | Any other (Please specify) | |

**F. IMPACT ON AGRICULTURE**

F.1. Have you any land under cultivation?

Yes ☐ No ☐ if no, go to Q F12

F.2. If yes, state the amount of cultivable land (acre): ---------

F.3. How many crops do you cultivate on the same land a year (cropping intensity):----

F.4. What is the percentage share of irrigated land of the total agricultural land? ---%

F.5. Do you have any electricity-run pump machine used for irrigation?

Yes ☐ No ☐

F.6. If yes, provide the following information:

| **Type of pump machine** | **Total number** | **Average Usage hours per crop season** | **Cost of electricity per season (afs)** | **Total operating cost (including maintenance) per season** |
|---|---|---|---|---|
| LLP [low lift pump] | | | | |
| STW [shallow tube well] | | | | |
| DTW [deep tube well] | | | | |
| Any other (specify) | | | | |
| | | | | |

F.7. Do you have any diesel-run pump machine used for irrigation?

Yes ☐ No ☐

F.8. If yes, provide the following information:

| **Type of pump machine** | **Total number** | **Average Usage hours per crop season** | **Cost of diesel per season (Afs)** | **Total operating cost (including maintenance) per season** |
|---|---|---|---|---|
| LLP [low lift pump] | | | | |
| STW [shallow tube well] | | | | |
| DTW [deep tube well] | | | | |
| Any other (specify) | | | | |
| | | | | |

F.9. On an average, what is your income from your farm per Jerib[75] per crop season (including family consumption and sale)? ---------- (afs)

F.10. On an average, what is your expenditure on agriculture per Jerib per crop season?

| | **Cost element** | **Afs** |
|---|---|---|
| 01. | Labour | |
| 02. | Seed | |
| 03. | Fertilizer | |
| 04. | Electricity | |
| 05. | Maintenance of pump machines | |
| 06. | Any other cost (specify) | |
| 07. | | |

F.11. Provide the following information on employment in your agricultural activity in one crop season:

| | | |
|---|---|---|
| 01. | Total **number** of family member worked | |
| 02. | Total Number of **days** worked by the family members | |
| 03. | Total **number of Wage** labourer used | |
| 04. | Total number of **days** worked by the wage labourers | |
| 05. | Average **wage rate** per day (afs) | |

F.12. Occupational change of the family members due to electricity connection in the area:

| Sl. No. | Name of the family Member | Male/Female | Occupation before electricity connection | Occupation after electricity connection |
|---|---|---|---|---|
| 01 | | | | |
| 02 | | | | |
| 03 | | | | |
| 04 | | | | |
| 05 | | | | |

F.13. Do you produce anything at your homestead that required electricity for lighting and direct production?

[75] One Jerib = 2,000 m2. 5 Jerib = 1 hectare. 1 acre = approx. 2 jeribs.

Yes ☐ No ☐

F.14. If yes, provide the following information:

| Sl. No. | Name of the product | Electricity is used for lighting the workplace (Tick) | Electricity is used for direct production (Tick) | Total annual income (Afs) |
|---|---|---|---|---|
| 01 | | | | |
| 02 | | | | |
| 03 | | | | |
| 04 | | | | |
| 05 | | | | |

## G. INSTITUTIONAL ASPECTS

G.1. Do you know who provides electricity in your area?

Government ☐

DABS ☐

Other [specify]……

G2. Are you satisfied with the services provided by the Electrical supply authority?

Yes ☐ No ☐

G.3. If no, why you are not satisfied with the service delivery of the Electric Supply authority?

---

G.4. What suggestions would you make to Electric supply authority to improve supply or further develop Electricity supply?

---

---

---------- ……

# OIEE Electrical Power Impact Assessment Study

**QUESTIONNARE, SET-A2**
**HOUSEHOLDS WITHIN THE ELECTRICAL SERVICE AREA (ESA)**
## NON-ELECTRICITY CONNECTED HOUSEHOLDS

**Introduction:** We represent the Afghanistan Electrical Power Impact Assessment Survey effort. We would like to know how the current electrical power circumstances affect you. Your answers to these questions will guide us for future electrical power improvements. The information that you provide will be treated confidentially – no one will know what you told us because it will be combined with other people's information.

---

**A. GENERAL INFORMATION**

A.1 GPS Coordinates ----------, A.2 GEO Code ----------, A.3 Province --------

A.4 District ----------, A.5 Town/Village: ----------

**B. DEMOGRAPHIC AND SOCIO-ECONOMIC BACKGROUND**

B.1 Name of the Household Head: ----------[optional] ,

B.2: Age: --------- years

B.3: Male: ☐ Female ☐

B4: Provide Information on Household Members:

| Sl No. | Items | Male | Female | Total |
|---|---|---|---|---|
| 01. | Family Members | | | |
| 02. | Children (less than 14 years) | | | |
| 03. | Income-earning members | | | |
| 04. | School-College-going members | | | |
| 05. | illiterate member (can not read & write) | | | |

B. 5. What are the different occupations of your family members?

| Sl No. | Type of occupation | Male | Female | Total |
|---|---|---|---|---|
| 01. | Agricultural activity on own land | | | |
| 02. | Wage labourer | | | |
| 03. | Office job | | | |
| 04. | Barber | | | |
| 05. | Metal worker | | | |
| 06. | Wood carpenter | | | |
| 07. | Bakeries | | | |
| 08. | Dentist/Dental technician | | | |

| | | | | |
|---|---|---|---|---|
| 09. | Teachers | | | |
| 10. | Army | | | |
| 11. | Shop owners | | | |
| 12. | Restaurant business | | | |
| 13. | Any other (specify) | | | |

B.6 Provide Annual Household Income of your household [or monthly then x 12]

| **01.** | **Source of income** | **Amount (afs)** |
|---|---|---|
| 02. | By selling agricultural output | |
| 03. | By selling own made product or services | |
| 04. | By wage-earning/salary | |
| 05. | Any other (specify) | |
| | | |

B.7. Do you think that your family income increased after your neighborhood was connected to the grid [government electric line] ?y?

Yes ☐ No ☐

B.8. If yes, how much did your family income increase? -------%

B.9 Specify how your family income increases after connected to the grid in your locality:

Established a business ☐ More job opportunities ☐

Improved production ☐ Sold more ☐ Other (specify) ☐

B.10. Provide information on Annual Expenditure of your family [or ask for month then x 12 ]

| **Sl.** | **Items of Expenditure** | **Amount (afs)** |
|---|---|---|
| 01. | Food items | |
| 02. | Clothing | |
| 03. | House rent (if any) | |
| 04. | Schooling and Education | |
| 05. | Doctor and Medicine | |
| 06. | Recreation and recreational items | |
| 07. | Transportation | |
| 08 | Air conditioning | |
| 09. | Any other (Please specify) | |

B.11. What is the average duration of lighting at night by traditional lamp? : ----- hrs

B.12. What is the total energy consumption (kerosene, fuel, etc) for lighting per month: --Afs

B.13. How much do you spend to buy traditional lamp (including candle) per year? ------(afs)

B.14. Which of the following facilities are available in your house? State their current market value.

| Sl.No. | Facilities | Number | Year acquired | Price paid (afs) | How do you run without electricity ? |
|---|---|---|---|---|---|
| 01. | TV | | | | |
| 02. | Radio | | | | |
| 03. | Refrigerator/freezer | | | | |
| 04. | Computer | | | | |
| 05. | Cooker | | | | |
| 06. | Iron | | | | |
| 07. | Washing machine | | | | |
| 08. | Fan | | | | |
| 09. | Blender | | | | |
| 10. | Sound equipment | | | | |
| 11. | Pump for well | | | | |
| 12. | air conditioner | | | | |
| 13 | Any other (Please specify) | | | | |

**C. LIFE AND ECONOMY**

C.1. How many hours male members in your family work (including households activities) after sun set?: ---------- hrs

C.2. How many hours female members in your family work (including households activities) after sun set?: ---------- hrs

C.3. How many hours do the children in your family spend on study at night? ------ hrs

C.4. What is your perception about the health care services in your locality after improvement of electric power supply?

Accessibility to hospital and clinic [longer hours of opening]:

Remains as before ☐, Increased ☐ Decreased ☐

Service delivery of the hospital and clinic:

As before ☐, Improved, but not significant ☐, improved significantly ☐

C.5. If you ticked the last box above, please describe or explain in your own words the ways in which health services at the clinic or hospital have improved due to electricity

……
……

C.6. What is your perception about the security situation due to onset of electric lighting in your locality?

As before ☐, Improved, but not significant ☐, improved significantly ☐

C.7. What is your perception about the crime rates and thefts due to electric lighting and reduction in electricity rationing in your neighborhood?

As before ☐, Improved, but not significant ☐, improved significantly ☐

## D. PREFERENCES IN ELECTRICITY CONSUMPTION AND ABILITY AND WILLINGNESS TO PAY

D.1. Would you like to have electricity connection at your house?

Yes ☐ No ☐

D.2. If yes, state why you want electricity connection at your house? Rank five items only (1st preference-1, 2nd preference -2, 3rd preference -3, 4th preference-4, 5th preference- 5)

| | **Preference List** | **Preference rank** |
|---|---|---|
| 01. | Social prestige | |
| 02. | Standard of living/comfortable | |
| 03. | Enjoyment of recreational facilities (e.g. TV, etc) | |
| 04. | Modern instrument (e.g. Computer, refrigerator, etc) | |
| 05. | Cheaper | |
| 06. | Safety | |
| 07. | Any other (Please specify) | |
| 08. | | |

D.3. If your answer is yes for the question no. D1, why have you not taken electricity connection at your house till now?

| **Sl.No.** | **Reasons for taking no electricity connection** | **Tick which ones are correct** | **Write down the most three important reasons** |
|---|---|---|---|
| 01. | No ability to pay for initial electric line connection | | |
| 02. | Not willing to pay for electric line connection | | |
| 03. | Official procedure to get connection is complex | | |
| 04. | Indirect Cost of pleasing the official is high | | |
| 05. | Once tried but did not work | | |
| 06. | Any other reason (please specify) | | |

## E. AGRICULTURE

E.1. Have you any land under cultivation?

Yes ☐ No ☐ if no, go to Q E12

E.2. If yes, state the amount of cultivable land (acre): ---------

E.3. How many crops do you cultivate on the same land a year (cropping intensity):--

E.4. What is the percentage share of irrigated land of the total agricultural land? ---%

E.5. Do you have any electricity-run pump machine used for irrigation?

Yes ☐ No ☐

E.6. If yes, provide the following information:

| **Type of pump machine** | **Total number** | **Average Usage hours per crop season** | **Cost of electricity per season** | **Total operating cost (including maintenance) per season** |
|---|---|---|---|---|
| LLP xx | | | | |
| STWxxx | | | | |
| DTWxxx | | | | |
| Any other (specify) | | | | |
| | | | | |

E.7. Do you have any diesel-run pump machine used for irrigation?

Yes ☐ No ☐

E.8. If yes, provide the following information:

| **Type of pump machine** | **Total number** | **Average Usage hours per crop season** | **Cost of diesel per season** | **Total operating cost (including maintenance) per season** |
|---|---|---|---|---|
| LLPxxx | | | | |
| STWxxx | | | | |
| DTWxxx | | | | |
| Any other (specify) | | | | |
| | | | | |

E.9. On an average, what is your income from your agricultural crop per Jerib per crop season (including family consumption and sale)? ---------- (afs)

E.10. On an average, what is your expenditure on agriculture per Jerib per crop season?

| | **Cost element** | **Afs** |
|---|---|---|
| 01. | Labour | |
| 02. | Seed | |
| 03. | Fertilizer | |
| 04. | Electricity | |

| | | |
|---|---|---|
| 05. | Maintenance of pump machines | |
| 06. | Any other cost (specify) | |
| 07. | | |

E.11. Provide the following information on employment in your agricultural activity in one crop season:

| | | |
|---|---|---|
| | | |
| 01. | Total number of family member worked | |
| 02. | Total Number of days worked by the family members | |
| 03. | Total number of Wage labourer used | |
| 04. | Total number of days worked by the wage labourers | |
| 05. | Average wage rate per day (afs) | |

E.12. Occupational change of family members due to electricity connection/improvement in your area:

| **Sl. No.** | **Name of the family Member** | **Male/Female** | **Occupation before electricity connection** | **Occupation after electricity connection** |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

# OIEE Electrical Power Impact Assessment Study

**QUESTIONNARE, SET-A3**
**HOUSEHOLDS OUTSIDE THE ELECTRICAL SERVICE AREA (ESA)**

**Introduction:** We represent the Afghanistan Electrical Power Impact Assessment Survey effort. We would like to know how the current electrical power circumstances affect you. Your answers to these questions will guide us for future electrical power improvements. The information that you provide will be treated confidentially – no one will know what you told us because it will be combined with other people's information.

---

## A. GENERAL INFORMATION

A.1 GPS Coordinates ----------, A.2 GEO Code ----------, A.3 Province --------

A.4 District ----------, A.5 Town/Village: ----------

## B. DEMOGRAPHIC AND SOCIO-ECONOMIC BACKGROUND

B.1 Name of the Household Head: ----------[optional] --,

B.2: Age: --------- years

B.3: Male: ☐ Female ☐

B4: Provider Information on Household Members:

| Sl No. | Items | Male | Female | Total |
|---|---|---|---|---|
| 01. | Family Members | | | |
| 02. | Children (less than 14 years) | | | |
| 03. | Income-earning members | | | |
| 04. | School-College-going members | | | |
| 05. | illiterate member (can not read & write) | | | |

B.5. What are the different occupations of family members?

| **Sl No.** | **Type of occupation** | **Male** | **Female** | **Total** |
|---|---|---|---|---|
| 01. | Agricultural activity on own land | | | |
| 02. | Wage labourer | | | |
| 03. | Office job | | | |
| 04. | Barber | | | |
| 05. | Metal carpenter | | | |
| 06. | Wood carpenter | | | |
| 07. | Bakeries | | | |
| 08. | Dentist/Dental technician | | | |

| | | | | |
|---|---|---|---|---|
| 09. | Teachers | | | |
| 10. | Army | | | |
| 11. | Shop owners | | | |
| 12. | Restaurant business | | | |
| 13. | Any other (specify) | | | |

B.6. Provide Annual Household Income of your household [or ask for month then x 12]

| | | |
|---|---|---|
| 01. | Source of income | Amount (afs) |
| 02. | By selling agricultural output | |
| 03. | By selling own made product or services | |
| 04. | By wage-earning/salary | |
| 05. | Any other (specify) | |
| | | |

B.7. Provide information on Annual Expenditure of your family

| | | |
|---|---|---|
| 01. | Items of Expenditure | Amount (afs) |
| 02. | Food items | |
| 03. | Clothing | |
| 04. | House rent (if any) | |
| 05. | Schooling and Education | |
| 06. | Doctor and Medicine | |
| 07. | Recreation and recreational items | |
| 08. | Transportation | |
| 09. | Any other (Please specify) | |

B.8. What is the average duration of lighting at night by traditional lamp? : ----- hrs

B.9. What is the total energy consumption (kerosene, fuel, etc) for lighting per month: --Afs

B.10. How much do you spend to buy traditional lamp (including candle) per year? ------(afs)

B.11. Which of the following facilities are available in your house? State their current market value.

| **Sl.No.** | **Facilities** | **Number** | **Year acquired** | **price paid (afs)** | **How do you run without electricity** |
|---|---|---|---|---|---|
| 01. | TV | | | | |
| 02. | Radio | | | | |
| 03. | Refrigerator/freezer | | | | |
| 04. | Computer | | | | |
| 05. | Cooker | | | | |
| 06. | Iron | | | | |
| 07. | Washing machine | | | | |
| 08. | Fan | | | | |
| 09. | Blender | | | | |
| 10. | Sound equipment | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 11. | Pump for well | | | | |
| 12. | Any other (Please specify) | | | | |

**C. LIFE AND ECONOMY**

C.1. How many hours male members in your family work (including households activities) after sun set?: ---------- hrs

C.2. How many hours female members in your family work (including households activities) after sun set?: ---------- hrs

C.3. How many hours do the children in your family spend on study at night? ------ hrs

**D. PREFERENCES IN ELECTRICITY CONSUMPTION AND ABILITY AND WILLINGNESS TO PAY**

D.1. Would you like to have electricity connection at your house?

Yes ☐ No ☐

D.2. If yes, state why you want electricity connection at your house? Rank five items only ($1^{st}$ preference-1, $2^{nd}$ preference -2, $3^{rd}$ preference -3, $4^{th}$ preference-4, $5^{th}$ preference- 5)

| | Preference List | Preference rank |
|---|---|---|
| 01. | Social prestige | |
| 02. | Standard of living/comfortable life | |
| 03. | Enjoyment of recreational facilities (e.g. TV, etc) | |
| 04. | Modern instrument (e.g. Computer, refrigerator, etc) | |
| 05. | Cheaper | |
| 06. | Safety | |
| 07. | Any other (Please specify) | |
| 08. | | |

D.3. If your answer is yes for the question no. D1, why have you not taken electricity connection at your house till date?

| **Sl.No.** | **Reasons for taking no electricity connection** | **Tick which ones are correct** | **Write down the most three important reasons** |
|---|---|---|---|
| 01. | No ability to pay for initial electric line connection | | |
| 02. | Not willing to pay for electric line connection | | |
| 03. | Official procedure to get connection is complex | | |
| 04. | Indirect Cost of pleasing the official is high | | |
| 05. | Once tried but did not work | | |
| 06. | Any other reason (please specify) | | |

## E. AGRICULTURE

E.1. Have you any land under cultivation?

Yes ☐ No ☐ if no, then finish

E.2. If yes, state the amount of cultivable land (acre): ---------

E.3. How many crops do you cultivate on the same land a year (cropping intensity):-- ……

E.4. What is the percentage share of irrigated land of the total agricultural land? ---%

E.5. Do you have any diesel-run pump machine used for irrigation?

Yes ☐ No ☐

E.6. If yes, provide the following information:

| **Type of pump machine** | **Total number** | **Average Usage hours per crop season** | **Cost of diesel per season** | **Total operating cost (including maintenance) per season** |
|---|---|---|---|---|
| LLP | | | | |
| STW | | | | |
| DTW | | | | |
| Any other (specify) | | | | |
| | | | | |

E.7. On an average, what is your income from your agricultural crop per Jerib per crop season (including family consumption and sale)? ---------- (afs)

E.8. On an average, what is your expenditure on agriculture per Jerib per crop season?

| | **Cost element** | **Afs** |
|---|---|---|
| 01. | Labour | |
| 02. | Seed | |
| 03. | Fertilizer | |
| 04. | Electricity | |
| 05. | Maintenance of pump machines | |
| 06. | Any other cost (specify) | |
| 07. | | |

E.9. Provide the following information on employment in your agricultural activity in one crop season:

| | | |
|---|---|---|
| 01. | Total number of family member worked | |
| 02. | Total Number of days worked by the family members | |
| 03. | Total number of Wage labourer used | |
| 04. | Total number of days worked by the wage labourers | |
| 05. | Average wage rate per day (afs) | |

# OIEE Electrical Power Impact Assessment Study

**QUESTIONNARE, SET-B 1**

# Settlement Demographic Survey

**WITHIN ELECTRICAL SERVICE AREA (ESA)**

Surveyor_____GPS_____

**Introduction:** We represent the Afghanistan Electrical Power Impact Assessment Survey effort. We would like to know how the current electrical power circumstances affect you. Your answers to these questions will guide us for future electrical power improvements. The information that you provide will be treated confidentially – no one will know what you told us because it will be combined with other people's information.

.

---

[Talk to Community Leaders ]

1. Name of settlement: _____

2. In which **year** was the settlement connected with electric power grid [government line] or power supply significantly improved? ----------

3. How many days in a month on average does your community receive electricity from the grid?t? ……days

4. How many **hours** of electricity does the settlement usually receive in **one day on average**? ……hours

5. What is the total number of households? ----------

6. How many families/households **are connected** to electricity in the settlement? …….

7. What is the total population? ----------, Male: ----------, Female: ----------

8 What is the total number of:

   (i) Primary school: ----------, Enrolled students: ----------, Male: -----, Female: ----------
   (ii) Secondary school: ----------, Enrolled students: ----------, Male: -----, Female: ----------
   (iii) Other academic institution: ----------, enrolled student: --------, Male: -----, Female: ---
   -

9. . Please provide the following information:

| Sl.No. | Items of Information | Total number | Number connected with electric grid |
|---|---|---|---|
| 01. | Primary school | | |
| 02. | Secondary school | | |
| 03. | Other academic institution | | |
| 04. | Shops | | |
| 05. | Flour /oil/rice mills | | |
| 06. | Cold storage | | |
| 07. | Large industry (specify\|) | | |
| 08. | Small & Cottage industries (specify) | | |
| 09. | Mosque | | |

| | | | |
|---|---|---|---|
| 10. | Post Office | | |
| 11. | Telephone office | | |
| 12. | Bank | | |
| 13. | Health centre (clinics/hospital) | | |
| 14. | Petrol pump | | |
| 15. | Any other commercial/industrial unit (please specify) | | |

10. What percentage of land is brought under irrigation? ----------%

11. What percentage of irrigated land is irrigated by electric power driven pump machines?____%

12. Sources of drinking water: _____

a) Percentage of people using common ell/karez_____%

b) Percentage of people using private well/karez_____%

© Percentage of people using other sources of water (Please specify) ---------- %

13. Uses of Latrines:

a) Percentage of people using sanitary latrines_____%

b) Percentage of people using pit latrines_____%

c) Percentage of people using hanged latrines ---------- %

d) Percentage of people using open space: ----------%

e) Percentage of people using any other type of latrine (please specify) ----------%

14. What is the perception of the people in the settlement about **health care** service?

Since electricity connected to the grid , accessability to hospital and clinic [hours of opening]:

Remains as before ☐ Increased ☐ Decreased ☐

Since electricity connected , service delivery of the hospital and clinics :

As before ☐ , Improved, but not significant ☐ , improved significantly ☐

15. Is there any street lighting in your settlement?

Yes ☐ no ☐

16. What is the perception of the people in the settlement about the **security** situation due to electric lighting and reduction in electricity rationing?

As before ☐ , Improved, but not significant ☐ , improved significantly ☐

17. What is the perception of the people in the settlement about the **crime rates and thefts** due to electric l lighting and reduction in electricity rationing?

As before ☐ , Improved, but not significant ☐ , improved significantly ☐

18. What is the perception of the community about **non-connection of electricity** by many households in the settlement?

| Sl.No. | Reasons for taking no electricity connection | Tick which ones are correct | Write down the most three important reasons |
|---|---|---|---|
| 01. | No ability to pay for initial electric line connection | | |
| 02. | Not willing to pay for electric line connection | | |
| 03. | Official procedure to get connection is complex | | |
| 04. | Indirect cost of pleasing the official is high | | |
| 05. | Once tried but did not work | | |
| 06. | Any other reason (please specify) | | |

19. General impression of the people in the settlement about electric power supply (present observed impact, future potential impact, problems identified, demand, service delivery of electric power supply authority, suggestions etc.).

_____

_____

# OIEE Electrical Power Impact Assessment Study

**QUESTIONNARE, SET-B2 control**

# Settlement Demographic Survey

**OUTSIDE ELECTRICAL SERVICE AREA (ESA)**

Surveyor_____GPS_____

**Introduction:** We represent the Afghanistan Electrical Power Impact Assessment Survey effort. We would like to know how the current electrical power circumstances affect you. Your answers to these questions will guide us for future electrical power improvements. The information that you provide will be treated confidentially – no one will know what you told us because it will be combined with other people's information.

.

---

[Talk to Community Leaders ]

1. Name of settlement: _____

2. What is the total number of households in your settlement? ----------

3. What is the total population? ----------, Male: ----------, Female: ----------

4. What is the total number of:

   (i) Primary school: ----------, Enrolled students: ----------, Male: -----, Female: ----------
   (ii) Secondary school: ----------, Enrolled students: ----------, Male: -----, Female: ----------
   (iii) Other academic institution: ----------, enrolled student: --------, Male: -----, Female: ----------

5. Please provide the following information:

| Sl.No. | Items of Information | Total number | Electricity Source? A] diesel generator = genset B] solar |
|---|---|---|---|
| 01. | Primary school | | |
| 02. | Secondary school | | |
| 03. | Other academic institution | | |
| 04. | Shops | | |
| 05. | Flour /oil/rice mills | | |
| 06. | Cold storage | | |
| 07. | Large industry (specify\|) | | |
| 08. | Small & Cottage industries (specify) | | |
| 09. | Mosque | | |
| 10. | Post Office | | |
| 11. | Telephone office | | |
| 12. | Bank | | |
| 13. | Health centre (clinics/hospital) | | |
| 14. | Petrol pump | | |
| 15. | Any other commercial/industrial unit (please specify) | | |

6. What percentage of land is brought under irrigation? ----------%

7. What percentage of irrigated land is irrigated by diesel driven pump machines?____%

8. Sources of drinking water: _____

   a) Percentage of people using common well/karez_____%

   b) Percentage of people using private well/karez_____%

   © Percentage of people using other sources of water (Please specify) ---------- %

9. Uses of Latrines:

   a) Percentage of people using sanitary latrines_____%

   b) Percentage of people using pit latrines_____%

   c) Percentage of people using hanged latrines ---------- %

   d) Percentage of people using open space: ----------%

   e) Percentage of people using any other type of latrine (please specify) ----------%

10. What is the perception of the people in the settlement about the **security** situation over time?

    As before ☐, Gradually improving ☐ Gradually deteriorating ☐

11. What is the perception of the people in the settlement about the **crime rates and thefts** over time?

    As before ☐, Gradually improving ☐ Gradually deteriorating ☐

12. Does the community want to be connected to the grid?

    Yes ☐ no ☐

13. If yes, why [please provide specific reasons]?

    _____

    ---

# OIEE Electrical Power Impact Assessment Study

**QUESTIONNARE, SET C1-A**

**MARKET SURVEY WITHIN THE ELECTRICAL SERVICE AREA (ESA)**

1. Name of bazaar: _____2. Village/Town _____

3. District_____

4. In which year was the market connected with electrical power? ---------

5 how many hours of electricity are available daily? …….

6. Total number of sales stalls in the market: ----------

7. Of the total sales stalls, how many sales stalls are for electrical goods? -------

8. Total number of manufacturing/producing units in the market: --------

9. Total number of sales stalls connected with electric power: ----------

10. Total number of manufacturing/producing stalls connected with electric power: -----

11. Of the total stalls, how many were established:

    (a) Before electricity available in the market: ----------
    (b) After electricity available in the market: ---------

12. What is the opening and closing time of the market?

    (a) Before electricity was available, it opened at ------- am, and closed at ---- pm
    (b) After electricity is available, it opened at ------- am, and closed at ---- pm

13. Since electricity was connected, have your sales increased?

    Yes ☐ No ☐

14. If yes, how much have your sales increased %.....

15. General impression of the shop owners and manufacturers in the market about electric power supply (present observed impact, future potential impact, identified problems, solution, demand, etc.).

    _____

    _____

# OIEE Electrical Power Impact Assessment Study

**QUESTIONNARE, SET C1-A control**

**MARKET SURVEY OUTSIDE THE ELECTRICAL SERVICE AREA (ESA)**

1. Name of bazaar: _____2. Village/Town _____

3. District_____

4. Total number of sales stalls in the market: ----------

5. Total number of manufacturing/producing units in the market: --------

6. Total number of stalls using electricity: ----------

7. Source of electricity ?

   Diesel generator ☐ solar ☐ other [please specify]……..

8. What is the opening and closing time of the market/ open……. close …….

9. What is the general impression of the shop owners and manufacturers in the market about electric power (do they want it, is it too expensive to connect, can they afford electricity bill etc. ).

   _____

   _____

# OIEE Electrical Power Impact Assessment Study

**QUESTIONNARE, SET C2-A**
**SHOPS/COMMERCIAL/INDUSTRIAL UNITS SURVEY**
**WITHIN THE ELECTRICAL SERVICE AREA (ESA)**

SURVEYOR: _____ CODE: _____

We work for a company that is surveying the socio-economic conditions related to the electrical power supply in Kandahar and Lashkar Gah and we are trying to find out about economic activity related to the power supply. We hope that you will be willing to help us with some information that will be confidential – no one will know what particular information you gave us because it will be combined with other people's information.

1. Name of bazaar: _____2. Village/Town _____

3. District_____

4. Describe the **type** of shop/commercial/industrial unit? ----------

5. In which year was this shop/unit established? ----------

6. What are the major items you produce or sell? (Write down first important item first, and then second important item second, and so on):

| Sl.No | Items | Self-produced | Locally made | Foreign Made | Selling Price/unit (Afs) |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

7. Is your unit connected to electric grid [government line] r?

   Yes ☐ No ☐

8. If yes, what is electricity used for? (Tick one or more )

   Lighting ☐ Production ☐ Heating ☐ computer ☐

   other ……..

9. How much electricity do you consume in a month ……KwH

10 How much is your monthly electricity bil ……..afs

11. If the unit is electric power connected, what is the **sales** per day?

   Before electricity connection: ----------afs/day
   After electricity connection;---------- afs/day

12. If the unit is now electric power connected, what is the total **investment?**

Before electricity connection: ----------afs
After electricity connection;---------- afs

13. Since you were connected with electricity, have you bought any **machinery or equipment** for your business?

Yes ☐ No ☐

14. With this machinery and equipment, can you now produce for less cost, or produce more?

Yes ☐ No ☐

15. If yes, how much less does it cost you to produce with new machinery/equipment? %.....

16. If the unit is electric power connected, what is the total **employment**?

Before electricity connection: family labour (no.): ------, Wage labour (no.): ---------
After electricity connection: family labour (no.): ------, Wage labour (no.): ----------

17. When do you open and close your shop/unit?

(a) Before electricity was available, it opened at ------- am, and closed at ---- pm
(b) After electricity is available, it opened at ------- am, and closed at ---- pm

18. How many family members do you have? ----------

19. How many children do you have of school-going age?

No. of children that are of school-going age: ---------, Actually going to school (no.): ----------

20. What is your impression about electric power supply (present observed impact, future potential impact, identified problems, service delivery of the electric supply authority, suggestions, demand, etc.).

_____

_____

**OIEE Electrical Power Impact Assessment Study**
**QUESTIONNARE, SET C2-A control**
**SHOPS/COMMERCIAL/INDUSTRIAL UNITS SURVEY**
# OUTSIDE THE ELECTRICAL SERVICE AREA (ESA)

SURVEYOR: _____ CODE: _____
We work for a company that is surveying the socio-economic conditions related to the electrical power supply in Kandahar and Lashkar Gah and we are trying to find out about economic activity related to the power supply. We hope that you will be willing to help us with some information that will be confidential – no one will know what particular information you gave us because it will be combined with other people's information.

1. Name of bazaar: _____2. Village/Town _____

3. District_____

4. Describe the **type** of shop/commercial/industrial unit? ----------

5. In which year was this shop/unit established? ----------

6. What are the major items you produce or sell? (Write down first important item first, and then second important item second, and so on):

| Sl.No | Items | Self-produced | Locally made | Foreign Made | Selling Price/unit (Afs) |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

7. Do you use electricity in your shop/commercial unit?

Yes ☐ No ☐

8. If yes, what is electricity used for? (Tick one or more )

Lighting ☐ Production ☐ Heating ☐ computer ☐

other [please specify]……

9. How much do you spend to generate electricity in a month [fuel, repair, maintenance] ? ……KwH

10. What on average are your **sales** per day?

By volume ----------units/day

By value ---------- afs/day

11. What is the total **investment in your enterprise?**

----------afs

12. Have you bought any **machinery or equipment** for your enterprise in the last 6 months?

Yes ☐ No ☐

13. If yes, why did you acquire this machinery and equipment – please be specific?

……..

14. How many people do you employ?

family labour (no.): ------, Wage labour (no.): ---------

15. When do you open and close your shop/unit?

Open ……. Close …….

16. Would you like to have on-grid electricity i.e. be connected to the government system ?

Yes ☐ No ☐

17. If yes, tell us why – please be specific

……

……..

18. What would you be willing to pay to have your stall connected to the electrical grid?

…….afs

19. What can you afford to pay monthly for electricity for your stall? …….afs

## OIEE Electrical Power Impact Assessment Study

**QUESTIONNARE, SET-A1**
**HOUSEHOLDS WITHIN THE ELECTRICAL SERVICE AREA (ESA)**
**ELECTRICITY CONNECTED HOUSEHOLDS**

**Introduction:** We represent the Afghanistan Electrical Power Impact Assessment Survey effort. We would like to know how the current electrical power circumstances affect you. Your answers to these questions will guide us for future electrical power improvements. The information that you provide will be treated confidentially – no one will know what you told us because it will be combined with other people's information.

---

**A. GENERAL INFORMATION**

A.1 GPS Coordinates ----------, A.2 GEO Code ----------, A.3 Province ----------

A.4 District ----------, A.5 Town/Village: ----------

**B. DEMOGRAPHIC AND SOCIO-ECONOMIC BACKGROUND**

B.1 Name of the Household Head: [optional ]----------

B.2: Age: --------- years

B.3: Male: ☐ **Female** ☐

B4:
Provide Information on Household Members:

| Sl No. | Items | Male | Female | Total |
|---|---|---|---|---|
| 01. | Family Members | | | |
| 02. | Children (less than 14 years) | | | |
| 03. | Income-earning members | | | |
| 04. | School-College-going members | | | |
| 05. | illiterate member (can not read & write) | | | |

B 5. What are the different occupations of your family members?

| Sl No. | Type of occupation | Male | Female | Total |
|---|---|---|---|---|
| 01. | Agricultural activity on own land | | | |
| 02. | Wage labourer | | | |

## ANNEX F: REQUEST FOR PROPOSAL [SCOPING & SURVEY]

USAID | AFGHANISTAN
FROM THE AMERICAN PEOPLE

# SUPPORT Program

## REQUEST FOR PROPOSALS

## FOR

## KANDAHAR AND LASHKAR GAH ELECTRICAL SUPPLY IMPROVEMENT SOCIO-ECONOMIC IMPACT ASSESSMENT

**RFP NUMBER #02-2010**

**SUPPORT PROGRAM**
**KABUL, AFGHANISTAN**

## I. INVITATION

The USAID/Afghanistan (USAID/A) funded SUPPORT Program is inviting experienced professional enumeration firms, including suitably qualified local and/or international Non-Governmental Organizations (NGOs) to submit their proposal to undertake the following survey work on behalf of USAID/A's Office of Infrastructure, Engineering and Energy (OIEE):

1. A random survey of stakeholders in both Kandahar City and Lashkar Gah, including area residents from farming and non-farming households, shopkeepers and/or businesses, commercial and/or industrial estates, local and central government offices, local schools, universities, public and private health care facilities and hospitals, and local law enforcement agencies. Details of this proposed survey are discussed in the attached Scope of Work (SOW).

Proposals will only be accepted for the work for the full survey mentioned above for the two locations as described in the SOW. Proposals will not be accepted for less than the two locations.

Consortium or Joint Proposals will be considered provided that these proposals shall meet the criteria as stipulated in this RFP.

**Sealed Proposals shall be addressed and submitted to**:

Chief of Party
SUPPORT Program
Off Street 15 Wazir Akbar Khan
Sher Poor Street 40 Lane 2, House #1055
Kabul, Afghanistan

E-Mail address: RFPsurvey@afsupport.org

All Sealed Proposals must be clearly labeled as follows – ***RFP* – KANDAHAR AND LASHKAR GAH ELECTRICAL SUPPLY IMPROVEMENT SOCIO-ECONOMIC IMPACT ASSESSMENT SURVEY - *#02-2010* -** on the envelope indicating the name of the firm responding to this RFP and the firm's contact details. All sealed proposals must be delivered to the SUPPORT Compound in Kabul (the address is provided above) by a designated representative of the firm by 1500 Hrs on **April 29, 2010**. One original and five (5) photocopies are required for each proposal submission.

The attached Proposal Signature Form and Budget form must be completed and signed when replying to this RFP. Any Proposal received not using the attached forms, not including photocopies and/or received after the prescribed time and date will not be considered. No public opening of Proposals received shall be scheduled. All proposals received will be evaluated and reviewed for compliance and the final selection will be determined on or before May 5th, 2010 . All Proposal submissions will be acknowledged by e-mail.

## RFP PROPOSAL FORM

This Proposal Form must be completed, signed by an authorized representative of the firm and returned to the SUPPORT Program in hard copy or by e-mail.

### 1. TERMS AND CONDITIONS

Any Contract resulting from this RFP shall contain and comply with USAID and/or Federal Acquisition Regulations (FAR) and any other specific Terms and Conditions detailed in the Scope of Work.

**2. INFORMATION**

Any request for information related to this RFP must be forwarded by e-mail to the attention of COP at – RFPsurvey@afsupport.org – and each e-mail shall reference in the Subject Heading – "***RFP Kandahar – Lashkar Gah Electrical Impact Assessment Question***". All questions will be replied to within 48 hours via e-mail after receipt to all firms responding to this RFP.

**PROPOSAL**

**The Undersigned, having read the Terms and Conditions of this RFP, hereby offers to execute the services specified in the Terms and Conditions set out in this RFP.**

Date: _____

Name & Title: _____

Signature: _____

Name of Firm: _____

Address: _____

_____

_____

Afghanistan Business Registration #_____

Tel/Mobile #: _____

E-mail address: _____

Validity of Offer (minimum thirty (30) days):_____

## DOCUMENTS COMPRISING THIS RFP

**SECTION 1 – INSTRUCTIONS TO BIDDERS**

**SECTION 2 - PROPOSAL REQUIREMENTS**

**SECTION 3 - EVALUATION OF THE PROPOSAL**

**SECTION 4 – SCOPE OF WORK FOR SURVEY AND COST SHEETS**

## SECTION I

## INSTRUCTIONS TO BIDDERS

### 1. PURPOSE OF RFP

This Request for Proposal (RFP) is issued by the USAID/Afghanistan funded SUPPORT Program to contract with a qualified firm to provide enumerator-survey services as described in the attached Scope of Work to SUPPORT on behalf of USAD/A's Office of Infrastructure, Engineering and Energy (OIEE).

### 2. MARKING AND RETURNING PROPOSALS

All Sealed Proposals must be clearly labeled on the envelope with the reference ***RFP – KANDAHAR AND LASHKAR GAH ELECTRICAL SUPPLY IMPROVEMENT SOCIO-ECONOMIC IMPACT ASSESSMENT SURVEY - #02-2010,*** and submitted by a designated representative of the firm by 1500 Hrs on April 29th, 2010 to the SUPPORT Compound, Kabul.

The attached Form and Schedule must be completed and signed when replying to this RFP. Any Proposal received not using the attached forms and/or received after the prescribed time and date will not be considered.

### 3. REQUEST FOR INFORMATION

Any request for information related to this RFP must be forwarded by e-mail to the attention of COP at – RFPsurvey@afsupport.org – and each e-mail shall reference in the Subject Heading – "***RFP Kandahar – Lashkar Gah Electrical Impact Assessment Question***". All questions will be replied to within 48 hours via e-mail after receipt to all firms responding to this RFP.

### 4. CORRECTIONS AND ERRORS IN THE PROPOSAL

**4.1** All Proposals must be free of any erasure and/or white-out marks and/or other corrections. Any proposal received with corrections, erasures etc will be rejected.

**4.2** Bidders are expected to examine these instructions, the Scope of Work, and all requirements and schedules pertaining to the work or Proposal. Failure to do so will be at the Bidder's own risk.

### 5. MODIFICATION AND WITHDRAWAL

**5.1** All changes to a Proposal must be received prior to the stated closing time and closing date. All changes submitted must be clearly marked as a modification and the change(s) supersede the earlier Proposal or clearly state the changes with respect to the original Proposal. Failure to comply with these instructions will result in an invalidated Proposal.

**5.2** Proposals may be withdrawn on written requests received from Bidders prior to the closing time and closing date. Negligence on the part of the Bidder confers no right for the withdrawal of the Proposal after it has been opened.

### 6. CURRENCY OF PROPOSAL

The currency of all Proposals must be in **US Dollars**. Any Proposal which does not conform to this condition will be considered invalid.

## 7. INVOICING AND PAYMENT

**7.1** The selected Bidder shall be paid in US Dollars. The Bidder must submit full payment documentation to the following address:

Chief of Party
SUPPORT Program- *RFP Kandahar-Lashkar Gah Electrical Impact Assessment*
Off Street 15, Wazir Akbar Khan
Sher Poor Street 40 Lane 2, House #1055
Kabul, Afghanistan

**7.2** SUPPORT's payment terms for this RFP will be as follows:

1. Twenty-five (25) percent of the Grand Total amount indicated in the contract as a mobilization payment. This amount will be payable within ten (10) days of contract signing by bank transfer to the selected firm's Kabul bank account.
2. Fifty (50) percent of the Grand Total amount indicated in the contract upon completion of the surveys and submission of survey data to SUPPORT. This amount is payable within net fifteen (15) days upon receipt of all documentation by the selected Vendor by bank transfer to the selected Vendor's Kabul bank account.
3. Twenty-five (25) percent of the Grand Total amount indicated in the contract as final payment upon receipt and acceptance of the final report as indicated in the Scope of Work and the contract by bank transfer to the selected Vendor's Kabul bank account. This amount is payable within fifteen (15) days of receipt of invoice.

## 8. AWARD / ADJUDICATION OF PROPOSALS

The Contract will be awarded to the Bidder offering a combination of the lowest acceptable prices and compliance with the requirements of this RFP subject to USAID/Afghanistan approvals.

## 9. RIGHTS OF SUPPORT

SUPPORT reserves the right to REJECT any Proposal for reasons mentioned above, and, unless otherwise specified by SUPPORT or by the Bidder, to accept any item in the Proposal.

SUPPORT reserves the right to REJECT any Proposal received from a Bidder who has previously failed to perform properly or complete contracts on time, or a Proposal received from a Bidder who, in the opinion of SUPPORT, is not in a position to perform the Contract.

This RFP, along with any Proposal thereto, shall be considered the property of SUPPORT and the Proposals will not be returned to their originators. In submitting the Proposal, the Bidder agrees to accept the decision of SUPPORT as to whether the Proposal meets the requirements stated in this RFP.

SUPPORT reserves the right to:

- Contact any and all references supplied by the Bidder

- Request clarification and/or additional supporting or supplementary data from the Bidder
- Arrange interviews with the proposed Contractor
- Reject any or all Proposals submitted
- Accept any Proposal in whole or in part
- Negotiate with the most favorable Bidders.

SUPPORT will treat in confidence those parts of the RFP proposal that may be marked as "*Confidential*" by a Bidder.

Proposals must be valid for a minimum of thirty (30) days from the closing date of this RFP.

SUPPORT and USAID/Afghanistan shall not be held responsible for any costs incurred by the Bidders in the preparation of their Proposal in response to this RFP.

### 10. CONTRACT TERMS AND CONDITIONS

Pursuant to the resulting contract, the Contractor shall provide the products and services specified in the Proposal. The resulting contract will define all applicable authorities related to this requirement and the criteria for fulfillment of the contract.

## SECTION 2

## PROPOSAL REQUIREMENTS

### 1. **PROPOSAL REQUIREMENTS**

All Proposals must comply with the following format in the English language:

1. Introduction. If a Consortium or Joint Proposal please clearly state so.
2. Brief background information about the Firm, including ownership and officers, years in business, registration documentation with the Afghan Government, tax identification number, and annual revenues for the last 2 years. If a Consortium or Joint Proposal a brief summary description of the Prime Contractor and the partners.
3. Survey experience as it is specifically relevant to this RFP and Scope of Work (SOW).
4. Description of general Approach and Methodology proposed for carrying out the SOW and services, including any information deemed relevant.
5. Detailed Work Plan and Schedule (timeframe) including an Organizational Chart showing clear responsibilities of staff and relationship if a Consortium or Joint Proposal.
6. Names of Key Staff assigned to this activity.
7. List of similar surveys undertaken in the last 3 years, including references and contact details of previous clients for these surveys.
8. Financial Proposal – use the individual Survey Budget Forms as specified in the SOW for the survey work to be performed, and the Final Costing Form.
9. Summary Section.
10. List of references.

# SECTION 3

# EVALUATION OF PROPOSALS

## 1. EVALUATION OF PROPOSALS

All Responses must contain the complete documentation as mentioned for SUPPORT to comprehensively evaluate each proposal.

SUPPORT will first evaluate proposals for compliance with the mandatory requirements of this RFP. Mandatory requirements will be indicated throughout this RFP by the words - *mandatory*, *shall*, *must* or *will* in regard to obligations of the Bidder.

Failure to comply with any of the terms and conditions contained in this RFP, including the provision for all required information, may result in a Proposal being considered non-responsive and rejected without further consideration.

Responses that comply with the stated mandatory criteria will be technically evaluated in accordance with the Evaluation Criteria indicated in Table 1.

During Proposal review, SUPPORT may at any time request clarifications and/or request additional information from any Bidder. SUPPORT representatives may visit the offices of a potential successful Bidder to assess their organizational and technical capabilities before making a final selection. Similarly SUPPORT may check references provided by any Bidder.

SUPPORT will consider Proposals that include multiple firms and/or multiple NGOs operating as a Consortium with different partners operating in different locations provided the following criteria will be met:

1. All Consortium or Joint Proposals clearly identify a "*Prime Contractor*" who will be responsible for the overall coordination and management of the surveys, reporting requirements, financial management, and the delivery of the products and services.

2. Consortium or Joint Proposals clearly articulate the roles, responsibilities and surveys to be undertaken by the partners.

3. SUPPORT will only receive invoices from the "*Prime Contractor*".

**Table 1. Evaluation Criteria**

| Item | Category | Points |
|---|---|---|
| 1 | **Expertise and Experience of the Bidder**<br><br>(Registration with the Afghanistan Government. Previous and/or current experience in executing socio-economic field | 25 |

| | | |
|---|---|---|
| | surveys in Afghanistan, including the ability to conduct field surveys in the Kandahar and Lashkar Gah locations, letters of recommendation from former clients demonstrating successful completion of similar field survey work in Afghanistan. | |
| 2 | **Methodology and Work Plan**<br><br>(Appropriateness of the methodology, demon-stration of clear understanding of the work requirements, clarity of the work plan) | 10 |
| 3 | **Expertise of Key Staff Proposed**<br><br>(Qualifications, skill sets, relevant survey work experience of key staff – *the Manager(s)* that will mange & supervise the surveys, data collection and final reports) | 10 |
| 4 | **Organizational Capacity**<br><br>(Background of the Organization, registration in Afghanistan, capacity to undertake and perform surveys as identified, type and magnitude of relevant surveys executed, annual turnover, ability to operate and perform in difficult operating environments, ability to undertake all survey work as described within the defined timeframe)[1] | 25 |
| 5 | **Proposal Documentation** | 5 |
| 6 | **Cost of Services** | 25 |
| **Total Score** | | **100** |

[1] Note: The above Categories are an indication of the various elements that will be reviewed during the evaluation of each proposal received by SUPPORT. These categories are meant to guide potential bidders in making a proper submission and not a complete indication of all the elements involved in the evaluation.

# SECTION 4

# SCOPE OF WORK
FOR
## KANDAHAR AND LASHKAR GAH ELECTRICAL SUPPLY IMPROVEMENT SOCIO-ECONOMIC IMPACT ASSESSMENT

### 1. INTRODUCTION

It is proposed that the firm will undertake a *Preliminary Scoping Survey* (PSS) to identify the areas of Kandahar City and five (5) Districts in Helmand Province ((Lashkar Gah, Sangin, Tangi, Kajaki and Musa Qala) receiving electrical power from the main electrical power grid to determine the specific areas or sub-districts that will be enumerated. This area shall be referred to as the *Electrical Service Area* (ESA). The Scoping Survey shall be comprehensive and identify a representative sample area within the ESA that will subsequently be enumerated.

The Scoping Survey will start on or about May 15th, 2010 and shall be completed within ten (10) calendar days or less and no later than May 24th, 2010.

Within five (5) calendar days upon completion of the Scoping Survey the firm will submit to SUPPORT its list of proposed areas within the ESA that the firm proposes to enumerate for the socio-economic impact assessment. The list will include a brief narrative as justification for selecting these particular areas and settlements. This list may also include *"control areas and/or settlements"* as determined by SUPPORT's Assessment Team. This report submission date shall not be beyond May 28th, 2010 at Close of Business.

SUPPORT's Assessment Team will review the firm's proposed list of areas and settlements from the Scoping Survey to be surveyed and provide the necessary instructions to the firm within three (3) calendar days to either proceed with the proposed Survey or amend the firm's proposed list of areas and settlements. All amendments to the proposed list of areas or settlements to be surveyed shall be completed and resubmitted to SUPPORT within two (2) calendar days for final approval.

Once approval to proceed with the Survey is provided by SUPPORT to the selected firm, the firm shall undertake the Survey of the agreed upon number of areas and settlements within the ESA.

The selected firm will provide, among others for the Scoping Survey and Assessment Survey: a Project Manager, Survey Supervisor(s), Survey staff and all logistical and security support for its personnel, including all transportation, all housing, and office space and management oversight as required by these activities.

The Assessment's socio-economic impact measures are intended to assess and record the impact(s) of electricity provision within the ESA to inform of any improvements in the economy and quality of life related to USAID/A's electrical power supply improvements.

The selected firm will work with SUPPORT's Assessment Team to design key questionnaires for the field enumeration work. In addition examples of *Key Indicators* that will be required to be reported upon include the following examples:

- Availability of daily electrical power in hours for households, shopkeepers, offices etc.
- Increase in electricity consumption Kilowatt Hours (KWH) for households, shopkeepers etc.
- Methods of use of the additional KWH. (For example, households with students can be asked if the increased hours of electricity availability did help increasing their study hours). Additionally, for tradesmen and shopkeepers it is anticipated that the increased availability of electricity may have resulted in increased sales of electrical appliances, new household electrical connections, longer working hours for commercial establishments, extended class times in schools, and encouragement to send girls to school.
- Observable and reported changes in routine functioning of life (for example, on methods of obtaining water for household use) due to increases in power supply and reduction in electricity rationing.
- Effect on small shops, businesses, industries, government offices, clinics, main hospitals, schools, colleges, and universities. (Main hospitals and government offices can be asked about [a] the difficulties they were facing before the improvement in electricity supply; and (b) the extent to which they are still experiencing any electricity rationing).

- Impacts on irrigation, agricultural practices and products (including crops), and agro-industry (including processing, cold storage and distribution).
- Hydro power costs significantly less than diesel-generated power, resulting in considerable savings in government fuel costs. With increased low-cost hydro power, local investment in small and large industries may increase, resulting in new job opportunities and consequent improvement in economic activities and the quality of life of all residents in Kandahar and Helmand. To the extent that such impacts are practicably measurable, the firm's enumeration team will be required to gather relevant data to analyze this aspect. The above mentioned questionnaires will be designed to elicit and capture this information.
- Impacts on public health.
- Improvement (if any) in the local security situation due to additional lighting.
- Any reduction in crime rates, including theft, due to reduction in electricity rationing.
- Impacts on power users' perceptions of (a) quality of service delivery and (b) institutional sources of the improvements in available power supply.

***Key Informant Interviews*** will be conducted to ascertain the views, opinions, historical perspectives, political significance, background and the Government of the Islamic Republic of Afghanistan's (GIRoA) point of view regarding the impacts of the electrical power improvements. The interviewees will include Ministers, Governors, Local Government Officials, Community Leaders, local area residents, and business-shop owners. The majority of these *Key Informant Interviews*, particularly those involving senior government officials shall be performed by SUPPORT's Assessment Team – however the Team shall have the selected vendor conduct interviews with local area residents, and business-shop owners.

The selected firm will be provided with appropriate survey forms in English, Dari and Pashto. A detailed description of these surveys is provided below, and Appendix B provides a partial list of Sample Questionnaires.

### 1.1 Survey of Electricity Consumers

For the purposes of this survey there are four types of electricity consumers – identified as follows:

1. Household Survey,
2. Agriculture (Irrigation),
3. Shopkeeper/Commerce and Industry (including service sector - Health Clinics and Hospitals for example), and
4. Focus Group Discussions.

Accordingly the survey will be divided into the following parts:

1. **Household Survey:** Households are the basic economic unit of Afghan society, and the survey questionnaires developed for this activity provide a useful description of their current economic and social circumstances. These questionnaires seek information on such topics as family size, employment characteristics, wealth and assets, education and health care practices, agricultural production, and gender issues, among others. In addition, the questionnaires attempt to relate the benefits of these characteristics to the electrical improvements and to increased electrical usage by household members. Households will also be asked if electrical meters are installed and their monthly electrical costs, and payment methods. A structured questionnaire survey for sample households, both for households having electricity connections

(*Treatment Households*) and households having no electricity connections (*Control Households*) will be conducted.

2. **S**
**ettlement Demographic Survey**: At the village level, a separate questionnaire will be used to collect information about the village's population, its schools and clinics, its agricultural land base and its available amenities, in addition to its current availability to electrical power and any historical data that may be provided. These questionnaires are to be completed through interviews with village leaders.

3. **Agriculture (Irrigation) Survey**: Surveys of electrical/solar pump users, diesel pump users and non- users of such technology will be carried out. This also follows a structured questionnaire survey. This questionnaire may be incorporated into the above two survey instruments.

4. **Shopkeeper/Commerce and Industry (including service sector) Survey**: The diverse nature of the Commerce, Industry and Service sector consumers preclude the use of a standard questionnaire. Instead managers of several different types of commercial, and industrial businesses, and service units (including health services) will be interviewed informally, supported by some checklists.

5. **Focus Group Discussions (FGD)**: The survey team will conduct focus group meetings with different social groups – farmers including pump users, village elders, commercial shop owners, industrialists, workers, and NGOs.

For **Resource Saving Assessment (**i.e. benefits due to cheaper alternatives available because of electrification compared to existing alternatives not involving electricity), some representative Commercial, Industrial and Service units and Households will be selected purposively.

The survey will also select potential consumers and assess their **Ability to Pay (ATP)** and **Willingness to Pay (WTP)** for electricity for new connections and electricity consumption.

The selected firm will be required to input the data generated by the surveys into Excel spreadsheets (template to be provided) and will provide these data on CD/DVD disks as well as the original completed survey sheets to SUPPORT's Assessment Team. An illustrative example of roles and scheduling for the activity follows.

## 2. WORK PLAN

### 2.1 Scoping Survey

The selected firm will conduct a preliminary assessment or Scoping Survey of the number and type of settlements in the ESA {the 5 districts in Helmand (Lashkar Gah, Sangin, Tangi, Kajaki and Musa Qala) plus Kandahar City as identified in Section 1 above}. This shall be accomplished by driving and observing settlements along and within the ESA noting the following information:

1. Name of settlement, and District and Province the settlements are located in.
2. Estimated or actual distance in Km between settlements.
3. Brief notes on available electrical power from the main grid and information on back-up power systems in use, for example diesel generators and/or solar power.
4. Brief notes/observations on whether the settlements are commercial centers, semi-rural or rural settlements.

5. Brief notes on key economic activities in each settlement. For example, primarily agriculture, mixed commercial shops etc.
6. Brief notes on key Government offices located in each settlement. For example, district offices, health clinics, Ministry of Agriculture etc.
7. Brief notes on major donor development assistance programs in each district. For example, is USAID/Afghanistan's Implementing Partners', the UN or others operating/providing development assistance/services in the area.
8. GPS location of each settlement.

Upon completion of the Scoping Survey, the selected firm will submit a report to SUPPORT on these activities proposing what settlements the firm proposes to survey for the Impact Assessment.

### 2.2 Impact Assessment Survey

The firm will propose and provide as many teams of enumerators as it deems most appropriate to conduct the Impact Assessment, managed by a single Project Manager. Each team will include at least one female enumerator. Each team will also be expected to enumerate two - three (2-3) areas/settlements per day. Within a single village, one enumerator will execute the key informant/electrical information and shopkeepers surveys, while the other team of two will execute household surveys, either as a pair or separately. If the first enumerator should finish the survey of key informants and shopkeepers before the household survey enumerators have completed at least three household questionnaires, then the first enumerator will also undertake the household surveys. The firm may propose an alternative method provided the anticipated results remain with same and comply with this Scope of Work.

The firm will provide experienced surveyors, who the SUPPORT Study Team will brief regarding the use of SUPPORT survey questionnaires and study approach. Training will be provided by SUPPORT project staff at facilities provided by the firm prior to the start
of the survey. The Project Manager should be at this training to coordinate and to provide translation as necessary.

Training might start in Kandahar or another suitable location, on or about the last week of May 6th, 2010. The firm will propose a means for maximizing the effectiveness of this training by bringing surveyors from different areas to the agreed training location to receive this training. If, however, additional training is needed as the survey moves from District to District, SUPPORT staff will be available to provide this training on adequate prior notice.

The Project Manager will ensure that survey staff are assembled as necessary and will provide all technical and administrative oversight required under the activity. Daily meetings should be held between the enumerators and the Project Manager to ensure speedy resolution of problems if and when they develop.

Completed questionnaires will be submitted bi-weekly to the firm's computer staff for entry into data spreadsheets. Spreadsheet templates will be provided to the firm for use in data entry.

Data files generated from this data entry should be provided to SUPPORT at the mid-point of the study on/about June 6/7, 2010 and two days after the completion of the survey on or about June 13th, 2010. In addition, completed survey questionnaires that form the basis for the data entry should also be provided in two batches. The first batch should be provided at the mid-point of

the survey June 6/7, 2010 and the second batch should be provided two days after the completion of the surveying on/about June 15th, 2010.

The firm's report writer will incorporate non-quantitative comments reported by the enumerators in an activity summary report, along with a review of the data generated under the survey.

## 3. SCHEDULE

The survey field enumeration will take place within three-five days after the above referenced training. Given the number of enumerators and settlements within the ESA to be identified, it is anticipated that the field work should be completed within fifteen (15) days or less. Data files and hardcopy of the completed questionnaires should be delivered to the SUPPORT Assessment Team within five (5) days of the completion of the field work. The final report for this activity should be submitted to the SUPPORT Assessment Team within five calendar (5) days of finishing this field work on or before June 19th, 2010.

## 4. COMPLIANCE AND SECURITY

### 4.1 COMPLIANCE

The selected firm will be a duly registered firm authorized to conduct business in Afghanistan by the Government of the Islamic Republic of Afghanistan, and to be considered for this activity each firm may be requested to submit all registration documentation to SUPPORT upon request.

*Regarding Taxes and Withholding of Taxes please note the following:*

In March 2009, a new provision was added to Afghanistan's Tax Law. Article 72 provides for a withholding tax on subcontractors to USAID's prime contractors. Subcontractors who are not registered with AISA and that provide supplies, materials, construction and other services under subcontract to USAID prime contractors are subject to a 7% fixed tax in lieu of income tax. This tax is withheld from the gross amount payable to the subcontractor. However, subcontractors, who are registered with AISA and provide the services listed above, are subject to a 2% withholding tax. The tax withheld is creditable against subsequent tax liabilities for the subcontractor.

SUPPORT as the prime contractor for USAID/Afghanistan is to withhold the tax from the selected subcontractor and remit the tax to the Da Afghanistan Bank to the account of the Medium Tax Office, bank account number #1203043.

### 4.2 SECURITY

The selected firm acknowledges that if awarded a Contract for the services under this RFP, the selected firm is solely responsible for the safety, security and transportation of its personnel, and affirms that it will make no claims for injury, loss of life or loss of or damage to property, against USAID/Afghanistan or the SUPPORT Contractor.

**Budget Form #1**
**Scoping Survey in ESA for OIEE Electrical Impact Assessment**

| **Personnel Costs in US$** | **Number Proposed** | **Duration in Total Days** | **Daily Rate per Personnel in US$** | **Per Diem Per Person in US$** | **Total Cost in US$** |
|---|---|---|---|---|---|
| Project Manager | | | | | |
| Field Supervisor | | | | | |
| Surveyors | | | | | |
| | | | | | |
| **Transportation Costs** | | | | | |
| Vehicle Rental | | | | | |
| | | | | | |
| **Communication Costs** | | | | | |
| Mobile Phones | | | | | |
| Sat Phone(s) | | | | | |
| | | | | | |
| **Operational Costs** | | | | | |
| Stationary | | | | | |
| Report Writer | | | | | |
| Computer Operator | | | | | |
| Support Staff | | | | | |
| Supplies | | | | | |
| Station (Office) Rental | | | | | |
| | | | | | |
| **Sub-Total** | | | | | |
| | | | | | |
| **Contingencies (5%)** | | | | | |
| | | | | | |
| **Administrative Costs** | | | | | |
| | | | | | |
| **Grand Total** | | | | | |

Date:_____

Signed:_____.

**Budget Form #2**
**Electrical Impact Assessment Survey in the ESA for OIEE**

| **Personnel Costs in US$** | **Number Proposed** | **Duration in Total Days** | **Daily Rate per Personnel in US$** | **Per Diem Per Person in US$** | **Total Cost in US$** |
|---|---|---|---|---|---|
| Project Manager | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Field Supervisor | | | | | |
| Surveyors | | | | | |
| | | | | | |
| **Transportation Costs** | | | | | |
| Vehicle Rental | | | | | |
| | | | | | |
| **Communication Costs** | | | | | |
| Mobile Phones | | | | | |
| Sat Phone(s) | | | | | |
| | | | | | |
| **Operational Costs** | | | | | |
| Stationary | | | | | |
| Report Writer | | | | | |
| Computer Operator | | | | | |
| Support Staff | | | | | |
| Supplies | | | | | |
| Station (Office) Rental | | | | | |
| | | | | | |
| **Sub-Total** | | | | | |
| | | | | | |
| **Contingencies (5%)** | | | | | |
| | | | | | |
| **Administrative Costs** | | | | | |
| | | | | | |
| **Grand Total** | | | | | |

Date:_____

Signed:_____

## OIEE Electrical Impact Assessment
## Total Survey Costs Form

| No. | Survey Components | Total Cost per Survey in US$ |
|---|---|---|
| **1** | **Scoping Survey of the ESA** | |
| **2** | **Electrical Impact Assessment Full Survey** | |
| | **Grand Total** | |

Date:_____

Signed:_____

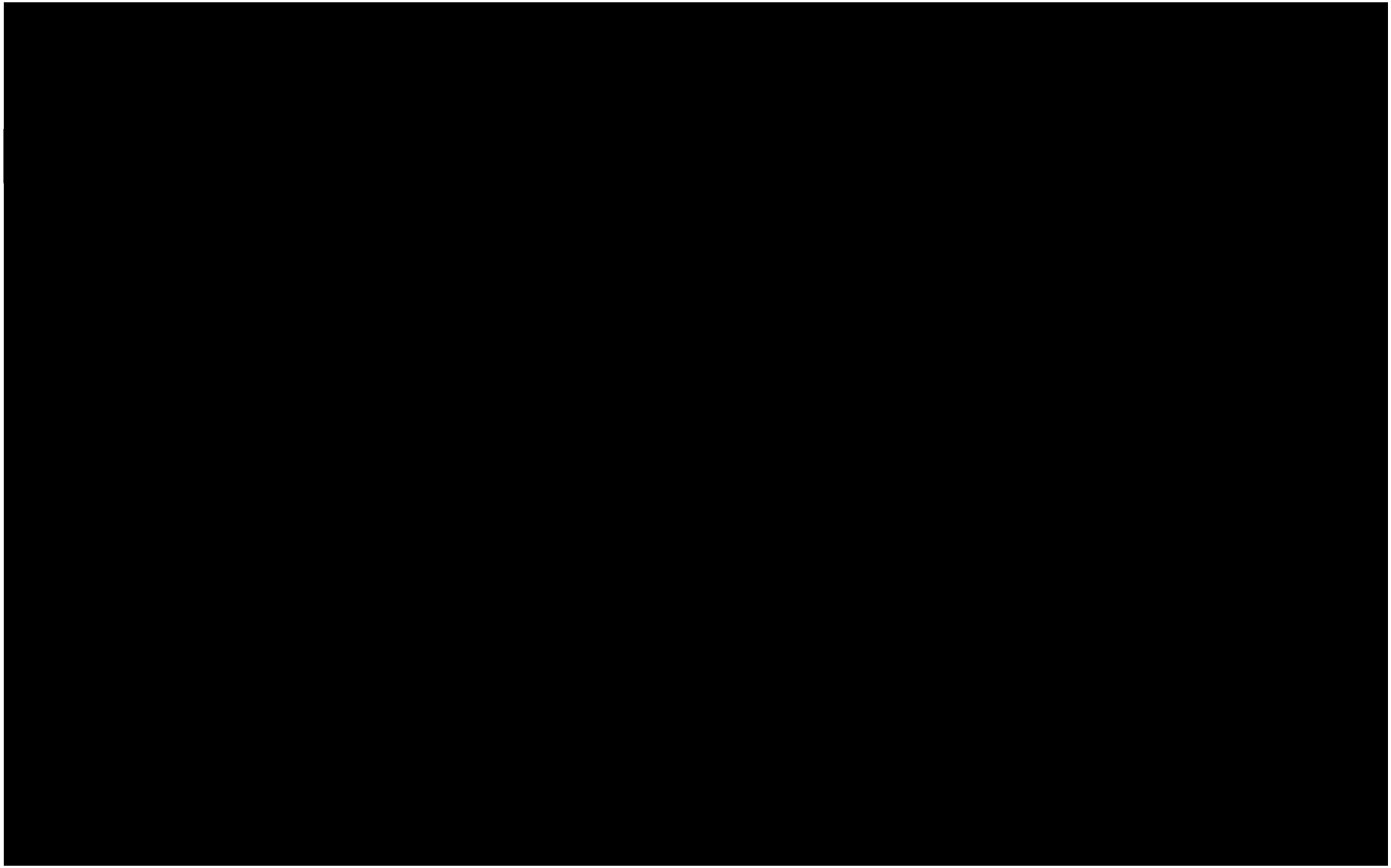
## ANNEX G: LIST OF PERSONS CONSULTED IN KABUL

| PERSONS CONSULTED IN KABUL | | | | | | |
|---|---|---|---|---|---|---|
| | **date** | **NAME** | **TITLE** | **ORG** | **CELL** | **EMAIL** |
| 1 | 18-May | Royce Wiles | Coordinator | Afghan Research & Evaluation Unit [AREU] | 798 246 583 | royce@areu.org.af |
| 2 | 20-May | Ahmad Shah Habib | Exec Director | Afghan NGOs Coordiantion Bureau | 0799 333 621 0700 200 266 | ancb@ancb.org admin@ancb.org |
| 3 | 20-May | Dr. Mohammad Azim "Omed" MD | PPA M&E National Consultant | Health Economics and Financing Directorate (HEFD) Ministry of Public Health (MoPH | 0093(0)700219311 0093(0)798216393 | Email: hefd.omed@gmail .com draomed@yahoo.com |
| 4 | 20-May | Dr. Mohammad Akram | Director of Planning and Policy) | Ministry of Public Health (MoPH] | 0799 335 339 | akramsear@yahoo.com |
| 5 | 23-May | Chris Humphries | Country Manager | Louis Berger Group [LBG] | 0707 683 656 | mhumphries@louisberger.com |
| 6 | 23-May | Jack Whippen | DCOP, Energy Sector Lead | Louis Berger Group and Black &Veatch [LBG and B&V] | 0799 620 012 | jwhippen@irp-af.com |
| 7 | 24-May | Eng. Mohammad Hashim Alimi | Director Strategic Planning | Min. Energy & Water [MEW] | 0797 717 505 | hashimmujda@gmail.com |
| 8 | 24-May | Ahmad Omar Ahmadi | DCOP, | Afghan Energy Info Centre, Min. Energy [AEIC], MEW | 0799 56 44 75 | aomar@aeai.net |
| 9 | 24-May | Randall Nottingham - | CoP | Afghan Energy Info Centre, Min. Energy [AEIC], MEW | 0799 79 50 31 | rnottingham@aeai.net |
| 10 | 29-May | Farid Ahmad Mateen | Director Planning & Policy | Ministry Agriculture, Irrigation and Livestock [MAIL[] | 0798 342 055 | faridahmad75@gmail.com |
| 11 | 29-May | Ghulam Rabani Haqiqatpl | Stats and Marketing Director | Ministry Agriculture, Irrigation and Livestock [MAIL[] | 0700 284 879 | rhaqiqatpl@mail.gov.af |

| | | | | | | |
|---|---|---|---|---|---|---|
| 12 | 29-May | Naseer Ahmad Fayez | Dirctor of Irrigation | Ministry Agriculture, Irrigation and Livestock [MAIL[] | 0799 31 40 64 | naseer.fayez@mail.gov.org |
| 13 | 29-May | Najeeb Mamnoon | Program Coord. Advisor | Ministry Agriculture, Irrigation and Livestock [MAIL[] | 0777 860 711 | najeeb.mamnoon@mail.gov.af |
| 14 | 29-May | Akbar Khan | Chief Executive Manager | Ministry Agriculture, Irrigation and Livestock [MAIL[] | 0708 860 904 | |
| 15 | 30-May | Ramesh Nepal | Asst Demand Side Advisor | USAID-funded Afghan Clean Energy Program [ACEP] - IRG Ltd | 0797 079 580 | rnepal@irgltd.com |
| 16 | 30-May | Alain Streicher | Chief Energy Efficiency Advisor | USAID-funded Afghan Clean Energy Program [ACEP] - IRG Ltd | 0796 843 197 | astreicher@irgltd.com |
| 17 | 31-May | Eng Sultan Ali Javid | Head of ERDA | Energy for Rural Development in Afghanistan, Ministry of Rural Rehabilitation & Development MRRD | 0799 036 456 | sultan.javid@mrrd.gov.af<br>javid37@yahoo.com |
| 18 | 31-May | Jamie Graves | NABP Manager for UNDP | National Area Based Program, Ministry of Rural Rehabilitation & Development MRRD/UNDP | 0798 01 98 12 | jamie.graves@undp.org |
| 19 | 31-May | Manoj Khadka | Micro Hydro Expert | National Area Based Program, Ministry of Rural Rehabilitation & Development [MRRD] | 0700 996 510 | manoj.khadka@mrrd.gov.af |
| 20 | 3-Jun | Tim Fox | G.M. Operations | Sustainable Energy Services Afghanistan [SESA] | 0708 373 215 | twoods@sesa.af |
| 21 | 16-Jun | Eng Ghulam Sediqi | | JICA | 0700 827 925 | sediqsediq.an@jica.go.jp |
| 22 | 16-Jun | Anita Richter | Component Manager | GTZ Afghanistan Energy Program, Renewable Energy Supp for Rural Areas | 0798 61 99 05 | anita.richter@gtz.de |
| 23 | 17-Jun | Abdullah Azadzol | Deputy Country Director & NSP Manager | FLAG Int. | 070 890 4450 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 24 | 17-Jun | Hector J. Vivero | (BDS Director) | FLAG Int. | +93 (0) 777 801 207 & +93 (0) 794 424 722 | hvivero@flaginternational.com hector.j.viviro@gmail.com |
| 25 | 19-Jun | Vivienne McKitrick | Manager | Louis Berger Group and Black &Veatch [LBG and B&V] | 0707 439 558 | mckitrickvl@bv.com |
| 26 | 20-Jun | Rich Mason | | USAID Mission Performance Management Project, Checchi | 0795 822 794 | rich.mason@me.com |
| 27 | 20-Jun | Abdul Wali Ibrahim | Operations Analyst | World Bank | 0700 21 21 82 | aibrahim@worldbank.org |
| 28 | 24-Jun | Oliver Dziggel | EGGi | USAID-funded Economic Growth & Governance Initiative | 0799 181 338 | odziggel@deloitte.com |
| 29 | 24-Jun | monthly meeting | ICE | Interministerial Committee on Energy | | |
| 30 | 24-Jun | Ajmal Shams | Head, Eng Dept. | National Solidarity Program, MRRD | 0799 126 878 | a.shams@afghanistan.org |
| 31 | 28-Jun | Eri Nishimura | First Secretary | Japanese Embassy | 0799-332-198 | eri.nishimura@mofa.go.jp |
| 32 | 29-Jun | Shuji Tokumaru | Project Formulation Officer | JICA Afghanistan Office | | Tokumaru.Shuji@jica.go.jp |
| 33 | 28-Jun | Asad Aleem | Energy Specialist | ADB Afghan Resident Mission | 079 55 66 591 | aaleem@adb.org |
| 34 | many | Dr. Hayat | Executive Director | Social Development & Legal Rights [SDLR] | 0700 66 90 26 | info@sdlr.af |
| | | | | | | |

# ANNEX H: FIELD VISITS & KEY INFORMANTS



ANNEX I: POWERPOINT PRESENTATION

USAID | AFGHANISTAN
FROM THE AMERICAN PEOPLE

# Kandahar & Lashkar Gah Electrical Supply Socio-Economic Impact Assessment

**STUDY Team:**
Dr. Mafizul Islam, Denis Dunn
**Technical Assistance Team:**
Mohammad Ehsan, Arslan Muradi
**Local Survey Firm:**
Dr. Hayatullah Hayat , SDLR

July 10 , 2010

**SUPPORT Project**
Checchi and Company Consulting, Inc.
and its Subcontractor
The Louis Berger Group, Inc.

Electrical Supply Impact Assessment 1

## Background

- Rationale for USAID Investment
  - Access to electricity is fundamental to development and vital for stability
  - Electricity is a powerful modernizing force for households, businesses, institutions, farms etc
  - "where there is no light, there is no State"

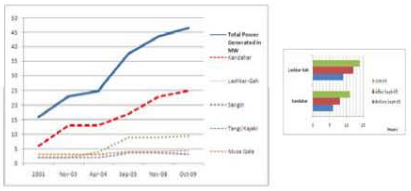
Electrical Supply Impact Assessment 2

## Background [contd]

- USAID expand electricity supply in Kandahar, Lashkar Gah, Musa Qala, Sangin and Kajaki/Tangi
  - rehabilitated Kajaki Hydro Power Plant
  - installed Diesel Power Plants and substations
  - tripled grid electricity supply capacity to 51 MW
  - reduced electricity rationing in 5 study districts

Electrical Supply Impact Assessment 3

## Background [contd] - Power Supply Improvement



Electrical Supply Impact Assessment 4

## Study Purpose

- Goal: systematic assessment of social and economic impacts of electrical supply improvements 5 districts in the ESA 2003-09
- Objectives:
  1. Assess the differences in available power supply
  2. Assess the impact of on-grid electrification
  3. Describe continuing problems and constraints
  4. Recommend improve electricity & lessons learned

Electrical Supply Impact Assessment

## Approach

- 10 step approach – workplan, background docs., survey instruments, scoping & survey, consult stakeholders, field visits [inspect assets, interviews/FGD], analyze data, draft report, present/brief, finalize
- Field survey – SDLR local survey contractor

Electrical Supply Impact Assessment 6

## Scoping Survey

- 11 - 21 May 2010 - 2 Supervisors & 12 Enumerators
- 405 Settlements were visited
  - Name of settlement, and District/Province location.
  - Electricity from the main grid and information on back-up power systems e.g. diesel generators and/or solar power.
  - Determined 14 wards, 18 commercial and 373 rural villages
  - Key economic activities in each settlement - e.g. primarily agriculture, mixed commercial shops etc.
  - Notes on key Government offices located in each settlement e.g. district offices, health clinics, Ministry of Agriculture etc.
  - Notes on major donor development programs in each district e.g. USAID/Afghanistan's Implementing Partners', UN or others
  - GPS location of each settlement.

Electrical Supply Impact Assessment 7

## Survey - Questionnaires

| | |
|---|---|
| A1 | 160 electrified **households** in the ESA |
| A2 | 160 non-electrified **households** in the ESA |
| A3 | 80 control **households** outside the ESA |
| B1 | 32 **settlements** [wards and villages] inside ESA |
| B2 | 16 **villages** outside ESA |
| C1-A | 21 **markets** surveyed within ESA |
| C1- B | 5 **markets** surveyed outside ESA [control] |
| C2-A | 105 shops/industries/**commercial** units within ESA |
| C2-B | 25 shops/industries/**commercial** outside ESA [control] |

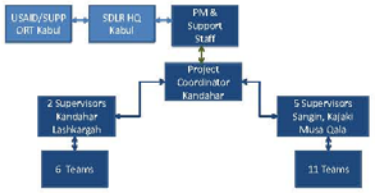
Electrical Supply Impact Assessment 8

## Survey Design Summary

| | | Sample no. of settlements [wards and villages] | Sample no. markets | Sample no. market visits | Sample households [HH] within ESA: Electrified [A1] | Sample households [HH] within ESA: Non electrified [A2] | Sample Control HH [A3] | Total questionaires |
|---|---|---|---|---|---|---|---|---|
| within ESA | District Centre/ City wards | 7 [B1] | 7 [C1-A] | 35 [C2-A] | 35 | 35 | - | 119 |
| | Commercial Villages | 9 [B1] | 9 [C1-A] | 45 [C2-A] | 45 | 45 | - | 153 |
| | Electrified Rural Villages | 16 [B1] | 8 [C1-A] | 25 [C2-A] | 80 | 80 | - | 186 |
| outside ESA | Control Villages | 16 [B2] | 5 [C1-B] | 25 [C2-B] | - | - | 80 | 126 |
| | TOTAL | 48 | 26 | 130 | 160 | 160 | 80 | 604 |

## Survey - SDLR Team

60 persons/17 teams




## Survey - Training Surveyors

Enumerator training was conducted in 2 locations:

Kabul:

Training of 3 senior Supervisor was conducted by SDLR in Kabul for two days (21 – 22 June 2010). The study team was present during training session

Kandahar:

This training was conducted from 24 – 26 June 2010 in which 51 enumerators/Surveyors and 4 supervisors participated.

Electrical Supply Impact Assessment 11

## Survey - Sampling

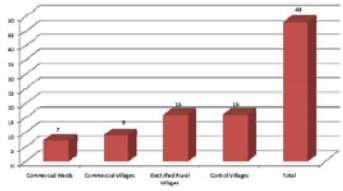
- Settlements were divided into:
  - Urban (City wards)
  - Commercial(more than 5 shops/commercial units)
  - Rural (less than 5 shops/commercial units)
- All settlements, households, markets and shops/commercial units were selected randomly
- Distance from main roads and commercial centers were also considered during selection of settlements

Electrical Supply Impact Assessment 12

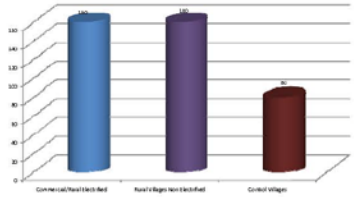
## Survey - Quality Control

- Clear explanation of the Survey aims
- Experienced Surveyors
- Supervision and Monitoring on Daily basis by Supervisors
- Weekly Checks by Project Coordinator
- Final Checks by PM
- Data Encoders & Feedback
- Study team field monitoring

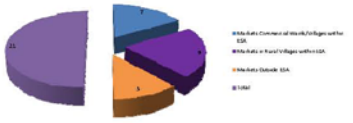
## Survey - Settlements



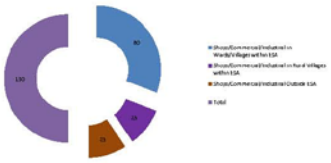
## Survey - Households



## Survey - Markets



## Survey - Commercial Units/Shops



## Survey - Challenges

- Open and free movement during field work
- Communication
- Receiving Reports
- Throwing camera into the river

## Survey Results

- Multidimensional socio-economic impacts at HH level – inside and outside home [agric., commercial etc.]
- External benefits flow to non-connected residents within ESA
- Direct effects mostly economic [business startup, expansion, new jobs, incomes]
- Indirect effects social and cultural – education, health, women's status, security
- direct & indirect synergize to produce economic growth, poverty reduction and human development

Electrical Supply Impact Assessment 19

## Survey Results [contd.]

- Increased incomes in 2/3 City GCHH and 1/5 comm. Villages but poverty still pervasive – 80% of sample HH below poverty line
- GCHH higher expenditures
- Food, clothing, health then energy
- Employment in GCHH higher in CV than City, but latter more varied occupations
- GCHH buy more appliances [TV, fridge, cooker, fan]
- Almost all HH own a radio.
- 10-20% GCHH own a computer

Electrical Supply Impact Assessment 20

## Survey Results [contd.]

- About 2/3 of rural HH in and outside ESA own a pump for well water.
- Due to load shedding, GCHH still rely alternative energy – 30% in City, 69% CV and 59% rural
- Almost all HH in villages rely kerosene/battery
- Access to GE promoted growth of markets, and enterprise sales, emp, and investment in City and CV
- No discernible impact of GE on land for irrigation and cultivation
- Only city residents perceived better health access after GC

Electrical Supply Impact Assessment 21

## Survey Results [contd.]

- 60% GCHH use electricity for cooking and 11% for heating, while negligible elsewhere
- Electricity for lighting by all sample HH and markets
- GCHH – electricity available City 15 days month [7hrs], CV 11 days [13 hrs] and rural 6 days [10 hrs]
- Less need to fetch water – 1/3 City, ½ CV & 80% rural
- Electric consumption is 362 kwh City, 156 kwh in CV and 8 kwh rural
- 100% City HH have meters, 22% CV and 5% rural

Electrical Supply Impact Assessment 22

## Survey Results [contd.]

- After schools became GEC, access to education improved City and Comm villages but not rural [better attendance and night-time learning]
- 1/3 school-age girls attending schools in GCHH City, whereas negligible elsewhere
- City wards [43%], commercial villages [22%] and 12% rural villages have street lighting
- 68% of City HH said street lighting improved security and 20% of HH said crime improved, but not sig.
- Villages said security & crime situation same as before

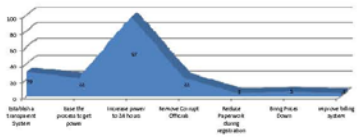
Electrical Supply Impact Assessment 23

## Survey Results [contd.]

- Almost all without GE want to be connected but many lack ability to pay
- Want connection to save money, to raise quality of life [modern appliances] and for security reasons
- Not satisfied with DABS – corruption, irregular supply, bias and incompetence
- Connection complex and unofficial payments
- Some benefits flow but marginal impacts at best

Electrical Supply Impact Assessment 24

## Survey - General Impressions

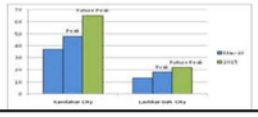


## ESA Problems

- lack access to reliable & affordable public electricity
- intermittent power due to power shortages
- bias in how electricity is made available
- fluctuating voltage
- load-shedding - residents turn to diesel generators
- widespread power theft
- complex and corrupt connection procedures
- weak collections

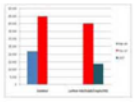
## ESA Problems – Power Shortages

- Power supply has not kept up with demand
- load-shedding 50% at best
- huge shortage of electricity – 38 to 62 MW



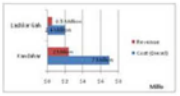
## ESA Constraints

- Technical losses
  - aging infra.
  - Taliban disruption
- Commercial losses
  - customers not bill/pay
  - illegals not pay/lost revenue
- Increasing supply diluted
  - huge population influx and demand
  - Legal connections 2x+ plus theft

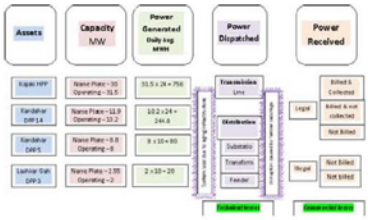


## Constraints [contd.]

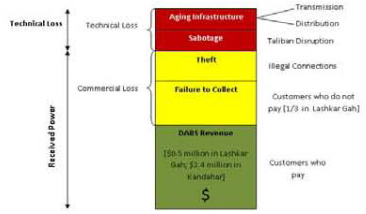
- Weak DABS capacity
  - engineers/management, systems, tools
  - Reliance on diesel – costly & vulnerable
  - Subsidy



## Constraints - SEPS framework



## Constraints - Dispatched Power






## Constraints - Power Data



## Recommendations ST

Boost generation capacity

- Mega hydro: installing 3rd turbine at Kajaki HPP
  - Components, cement, security, transmission line
- DPP 'farms': additional gensets - KIP etc
  - Costly [1MW =$0.5m 24/7 diesel cost], supply routes
  - Boost performance of existing gensets
- Micro-hydro: irrigation canals
  - Dahla Dam 4-5MW, Filcoh and Baba Wali , Boghra 3MW [Grishk Dam 4.8MW but only Grishk]



## Recommendations – ST [contd.]

- Small HH solar systems and community mini-grid systems for off-grid remote, rural villages
  - Rapid technological advancement and ample sun
  - preferred to small diesel generators and more traditional energy sources
- Mega solar system
  - Extreme heat and dust = high-level O&M
  - Vulnerable to sabotage
  - Disconnect Kabul and the field



## Recommendations – ST [contd.]

Reduce system losses [technical]

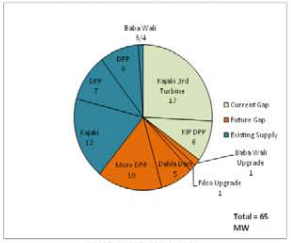
- Upgrade the transmission line running from Kandahar-Kajaki-Lashkar Gah;
- Upgrade electrical distribution systems [transformers, substation, feeder lines].

Weak DABS capacity – P.D., manuals, training, reporting, tools

## Recommendations - LT

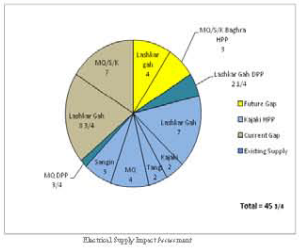
- 2nd phase Kajaki HPP 100MW – F/S
  - Indigenous = independence, energy security
  - Costly, long-term
- Connect SEPS to NEPS – F/S
  - Big investment
  - Cheap imported power
  - vulnerable

**Recommendations – Kandahar Current & Future Energy Supply**




Electrical Supply Impact Assessment 37

**Recommendations – Helmand Current & Future Energy Supply**




Electrical Supply Impact Assessment 38

## Lessons Learned

- Electricity vital for development and stability
- Development
  - Top priority, transformational, basic need
  - Light, heat, cooking, entertainment, information
  - 'lights on' proxy for progress
  - Target power – health, educ., econ dev, agric.
  - But almost impossible to build and maintain energy infrastructure in war zone

Electrical Supply Impact Assessment 39

## Lessons Learned [contd.]

- Stability
  - Lack of public service builds resentment to govt. - increasingly disillusioned with IROA and ISAF, and fearful of Taliban
  - few jobs, extreme poverty and sparse cash must be spent on diesel and Kerosene
  - Cultivate local support to diminish 'opposition'.
  - Tension stability & development - ST quick fix [diesel] vs. LT infra investment plus capacity DABS [policies, systems, manuals, training, tools]

Data Quality Assessment 40

## THANK YOU

Electrical Supply Impact Assessment 41

# ANNEX J: DETAILED DESCRIPTION OF SURVEY APPROACH

**Scoping Survey:**

This occurred during 11– 21 May 2010 and was carried out by 2 Supervisors & 12 Enumerators. 405 Settlements were visited and the following information obtained.

- Name of settlement, and District/Province location.
- Electricity from the main grid and information on back-up power systems e.g. diesel generators and/or solar power.
- Determined 14 wards, 18 commercial and 373 rural villages
- Key economic activities in each settlement – e.g. primarily agriculture, mixed commercial shops etc.
- Notes on key Government offices located in each settlement e.g. district offices, health clinics, Ministry of Agriculture etc.
- Notes on major donor development programs in each district e.g. USAID/Afghanistan's Implementing Partners', UN or others
- GPS location of each settlement.

**Training**

Enumerator training was conducted in 2 locations:

Kabul:

> Training of 3 senior Supervisor was conducted by SDLR in Kabul for two days (21 – 22 June 2010). The study team was present during training session

Kandahar:

> This training was conducted from 24 – 26 June 2010 in which 51 enumerators/Surveyors and 4 supervisors participated.

**Sampling:**

Settlements were divided into:

- Urban (City wards)
- Commercial(more than 5 shops/commercial units)
- Rural (less than 5 shops/commercial units)

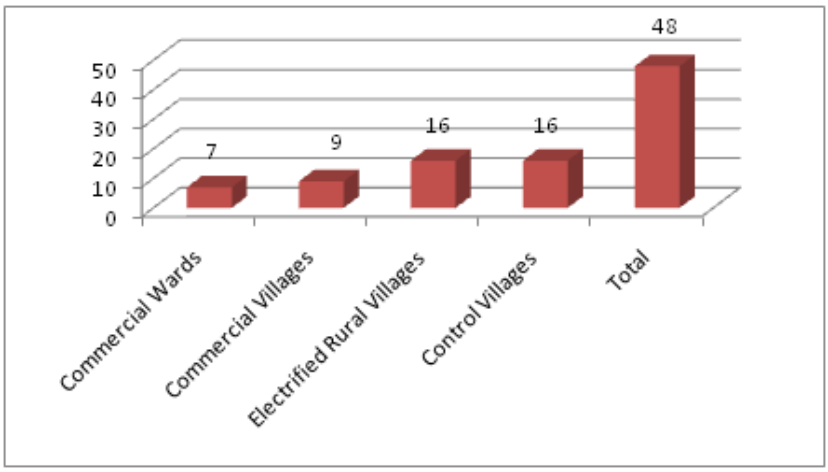
All settlements, households, markets and shops/commercial units were selected randomly

Distance from main roads and commercial centers were also considered during selection of settlements

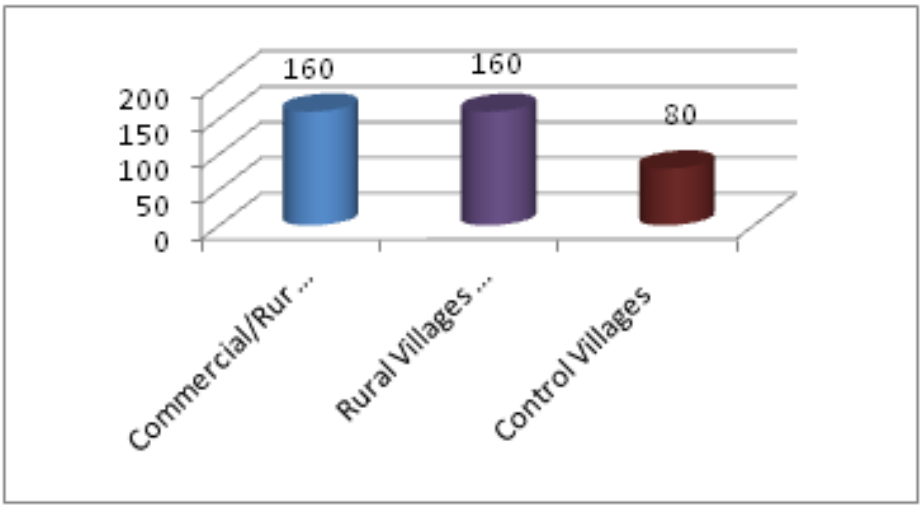
- Quality control
- Clear explanation of the Survey aims

- Experienced Surveyors
- Supervision and Monitoring on Daily basis by Supervisors
- Weekly Checks by Project Coordinator
- Final Checks by PM
- Data Encoders & Feedback
- Study team field monitoring

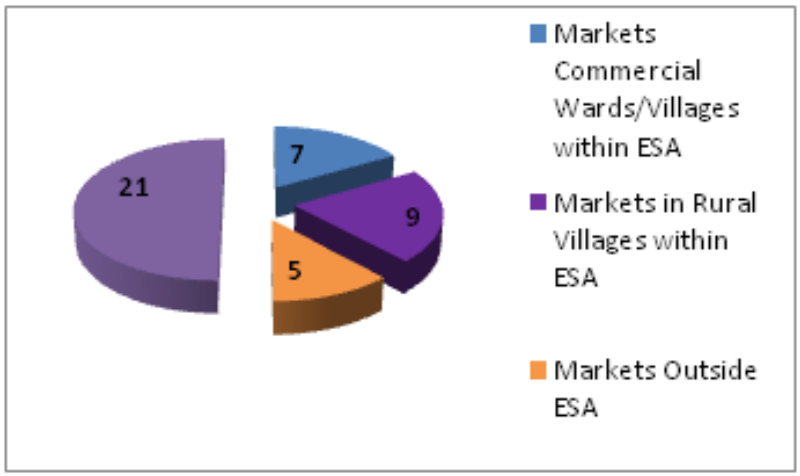
**settlementss**



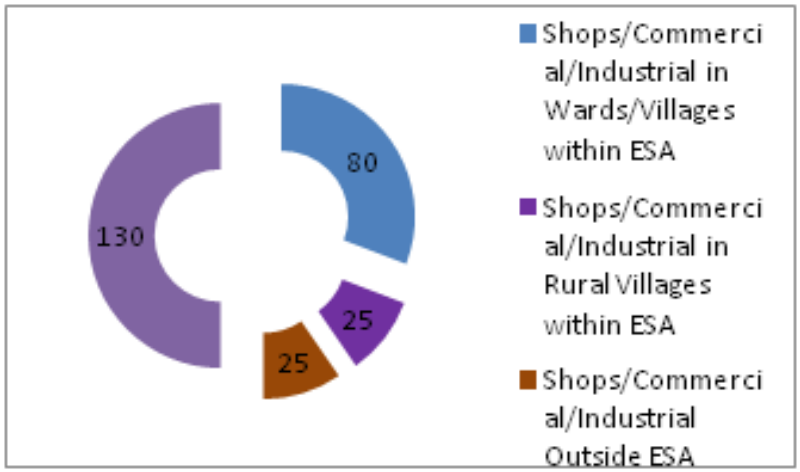

**Households**



**Markets**




**Commercial Units and shops**



# ANNEX K: SCOPING REPORT

SOCIAL DEVELOPMENT & LEGAL RIGHTS
AFGHANISTAN
د افغانستان د ټولنیزې پرمختیا او حقوقي مرستو ټولنه

# Social Development and Legal Rights - Afghanistan

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## Brief Narrative Report

## On

## Scoping Survey

## Kandahar and Lashkar Gah Electricity Supply

## Improvement Socio-Economic Impact Assessment

## May 2010

### 1. Introduction

A Request for Proposal (RFP) was issued by the USAID/Afghanistan funded SUPPORT Program to contract with a qualified firm to provide enumerator/survey services.

Social Development and Legal Rights (SDLR) Afghanistan an independent, non-allied, non-governmental, non-political, independent humanitarian organization which has been established in 1997 got the contract after an evaluation of its proposal for compliance with the mandatory requrements of the RFP.

The purpose of this survey is to undertake a random survey of stakeholders in both Kandahar City and Lashkar Gah, including area residents from farming and non-farming households, shopkeepers and/or businesses, commercial and/or industrial estates, local and central government offices, local schools, universities, public and private health care facilities and hospitals, and local law enforcement agencies.

In order to achieve the above goal and objectives, SDLR has undertaken a *Preliminary Scoping Survey* (PSS) to identify the areas of Kandahar City and five (5) Districts in Helmand Province ((Lashkar Gah, Sangin, Tangi, Kajaki and Musa Qala) receiving electrical power from the main electrical power grid to determine the specific areas or sub-districts that will be enumerated. These areas were referred to as the *Electrical Service Area* (ESA). A comprehensive Scoping Survey was undertaken in order to identify a representative sample area within the ESA that will subsequently be enumerated.

A preliminary assessment or Scoping Survey of the number and type of settlements in the ESA {the 5 districts in Helmand (Lashkar Gah, Sangin, Tangi, Kajaki and Musa Qala) plus Kandahar City} was undertaken. This survey took 11 days, started on 11 May 10 and completed on 21 May 10 including two days delay due to security problems in Kajaki district. There were totally 12 enumerators driving and observing settlements along and within the ESA noting the following information during scoping survey:

1) Name of settlement, and District and Province the settlements are located in.
2) Estimated or actual distance in Km between settlements.
3) Brief notes on available electrical power from the main grid and information on back-up power systems in use, for example diesel generators and/or solar power.
4) Brief notes/observations on whether the settlements are commercial centers, semi-rural or rural settlements.
5) Brief notes on key economic activities in each settlement. For example, primarily agriculture, mixed commercial shops etc.
6) Brief notes on key Government offices located in each settlement. For example, district offices, health clinics, Ministry of Agriculture etc.
7) Brief notes on major donor development assistance programs in each district. For example, is USAID/Afghanistan's Implementing Partners', the UN or others operating/providing development assistance/services in the area.
8) GPS location of each settlement.

## 2. Management of the Project

SDLR headquarters is based in Kabul while it has an operational regional office for southern region located in Kandahar city. The filed enumeration was coordinated by SDLR field office in Kandahar.

SDLR is planning that during Impact Assessment Survey, communication and correspondence with SUPPORT will be maintained by SDLR HQ in Kabul.

The project manger (PM) will be based in Kabul to communicate easily with SUPPORT office. A project Coordinator will be based in Kandahar to coordinate the field activities of all targeted districts and liaise with authority and other stakeholders if necessary.

He is mainly responsible to coordinate project activities with provincial government officials, UN, NGOs and other stakeholders in the areas while the supervisors are responsible for maintaining same relationship with district officials, CDCs, DDAs and community elders.

There are 5 field supervisors who will be assigned one per district to supervise and QA/QC the data collected by enumerators and also responsible to facilitate smooth running of the project at lower level. They will ensure to control each form filled at the end of the day and overcome any mistakes or falls information on the same day. The supervisors will compile the data/forms and onward pass them on weekly basis to field coordinator who will then handover these reports after his review and approval to the encoders based in SDLR's HQ Kabul to enter them in the excel spreadsheet.

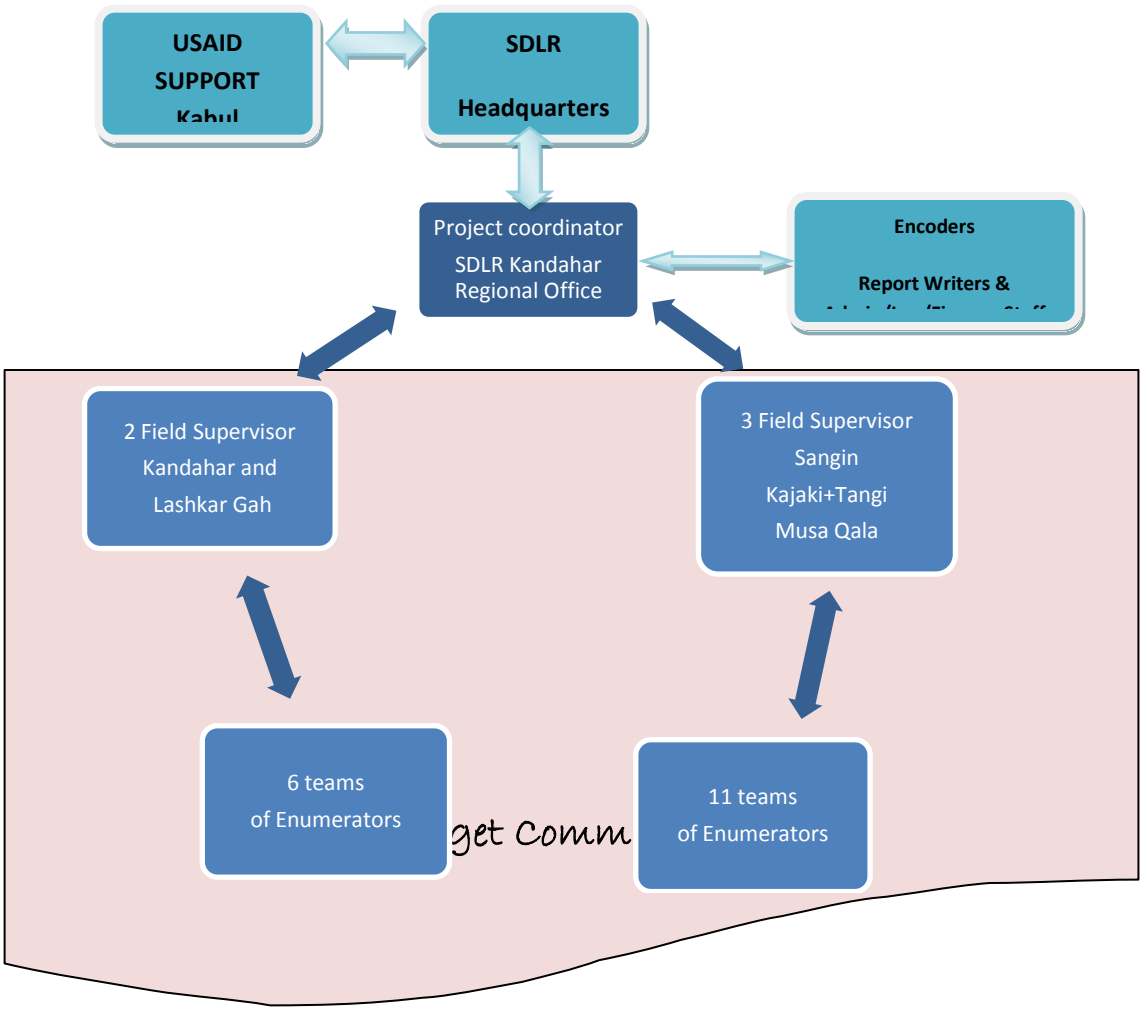
The field surveyors/enumerators are responsible to the field supervisors to report him on daily basis their achievement.

SDLR has 3500 registered enumerators throughout the country who are used on ad hoc basis for field enumerations. All these personnel including field coordinator, supervisors and enumerators are well-experienced in different types of projects during the past few years. Most of them are ex deminers who have served for mine action programs for 10 – 20 years in Afghanistan. They have extensive knowledge of communities throughout the country. They are working for SDLR survey projects since 2001. They have been used particularly in three socio-economic impacts surveys of projects which were awarded by SUPPORT to SDLR in Southern Afghanistan. Bellow is the communication system proposed for this project:

## 3. Field Operations and Achievement

There were totally 12 enumerators and 2 supervisors during the scoping survey. One supervisor with 4 teams was focusing on Kandahar and Lashkar Gah while the other supervisor was closely following the teams working in Kajaki, Tangi, Sangin and Musa Qala districts.

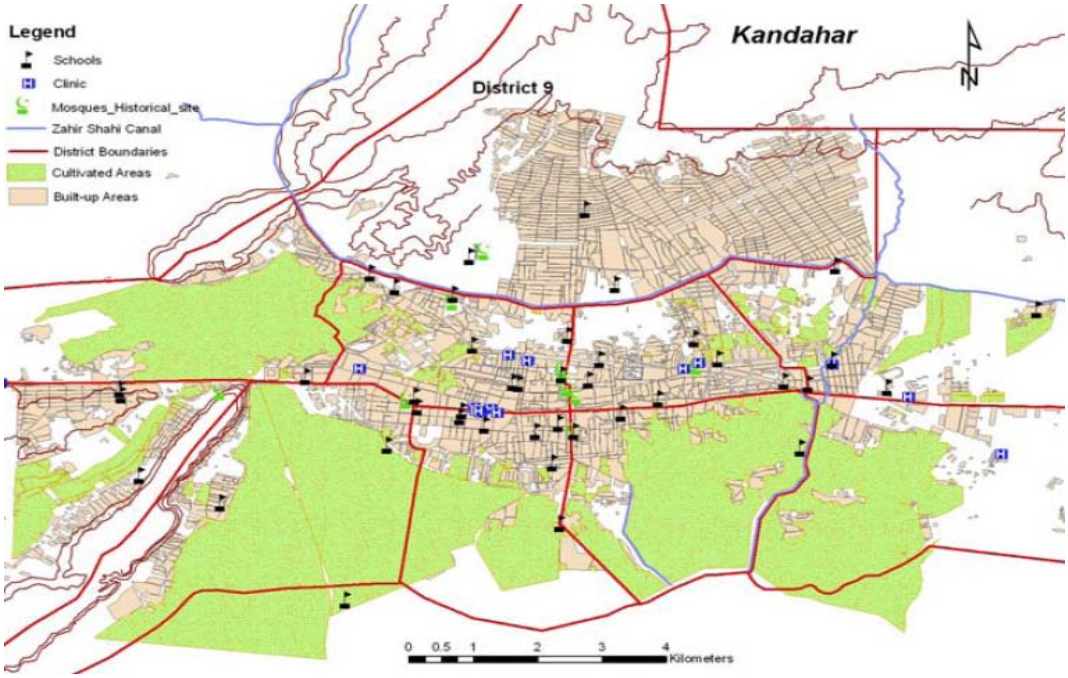
For the Impact Assessment Survey SDLR will follow the following system of communication in which both ways communication have been proposed:




llowing is the summary of the covered villages in all the above-mentioned locations:

## 4. Kandahar City

Kandahar City is divided into 10 wards. A total of 37062 households are located in these 10 wards out of which 3 wards are totally electrified and 7 wards are partially (50%) electrified.



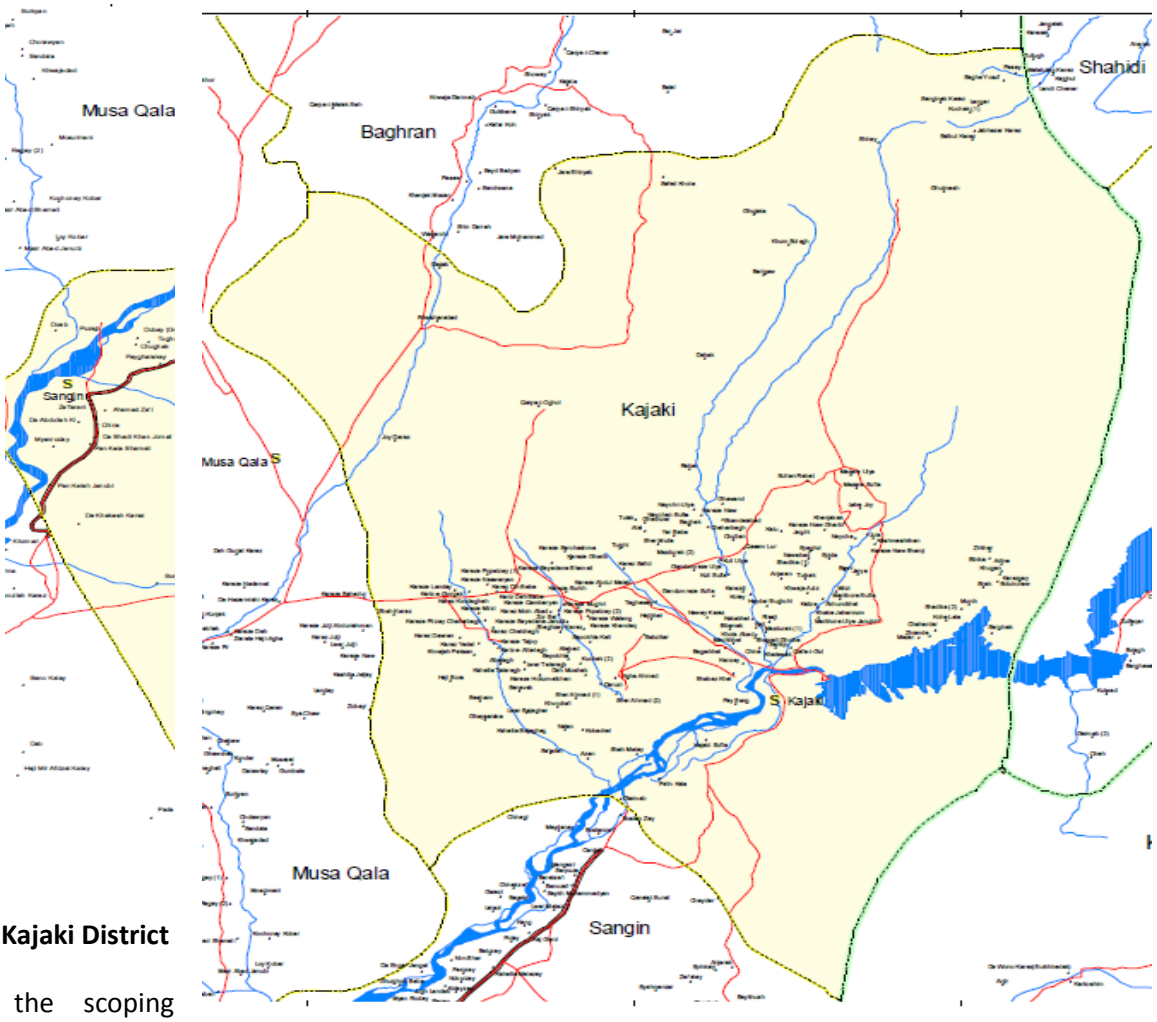

| Name | Number of Households | Remarks |
|---|---|---|
| Ward 1 | 3448 | |
| Ward 2 | 3700 | |
| Ward 3 | 2913 | |
| Ward 4 | 4596 | |
| Ward 5 | 2500 | |
| Ward 6 | 646 | |
| Ward 7 | 2814 | |
| Ward 8 | 1800 | |
| Ward 9 | 10000 | |
| Ward 10 | 4645 | |
| **Total** | **37062** | |

### 3.2 Lashkar Gah District

Lashkar Gah distirct compromises of 4 wards and 31 rural villages. There are totally 26600 households in Lashkar Gah Center within 4 wards limits. These settlements include 4 commercial, 2 semi commercial and 26 rural villages out of which 3 villages are electrified and 23 are non-electrified villages.

### 3.3 Sangin District

A total of 79 settlements were visited in Sangin district of Himand province. Out of which 4 were commercial and 75 rural settlements. Among them 47 settlements were electrified while rest of 32 settlements were non-electrified.



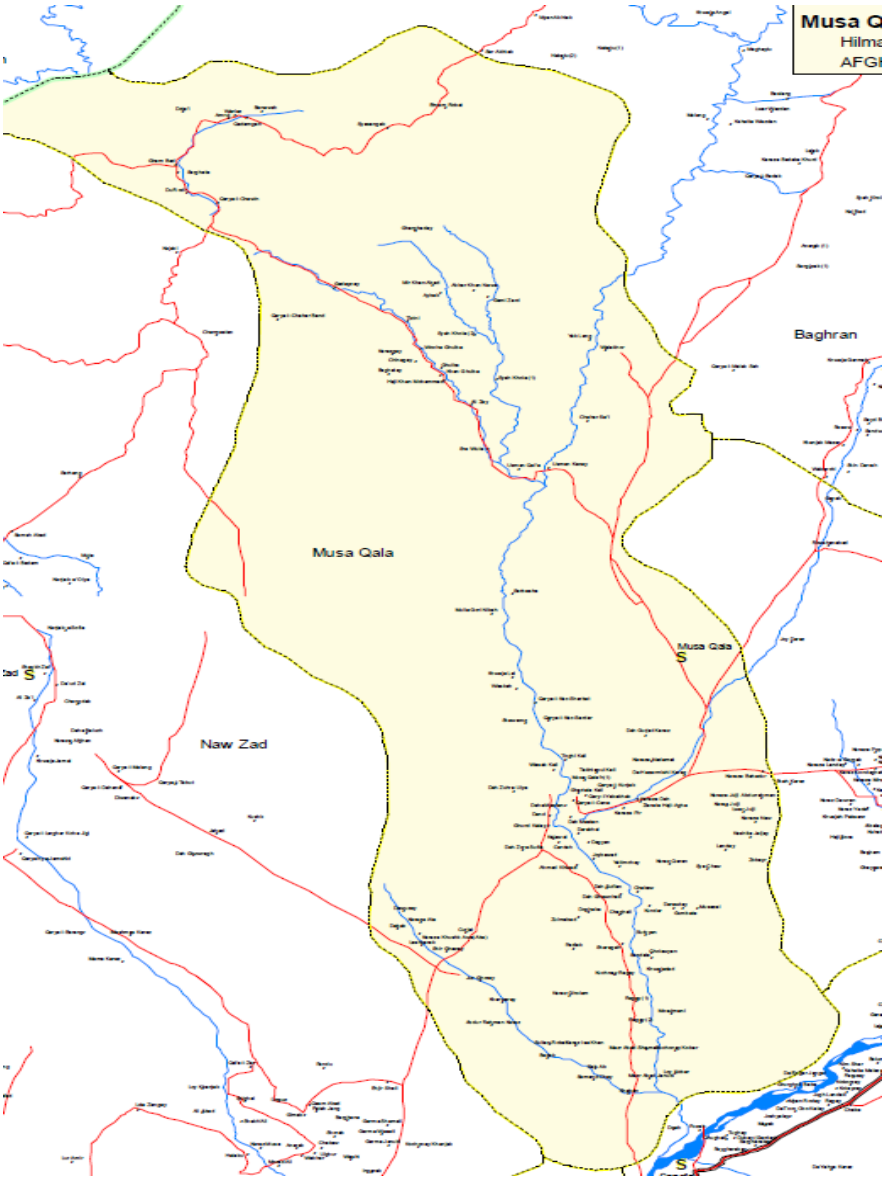

### 3.4 Kajaki District

During the scoping survey a total of 163 settlements were visited in Kajaki district of Hilmand province. Out of which 6 were commercial and 157 were classified as rural settlements. Among them, 121 were electrified and 42 were non-electrified.

### 3.5 Tangi

Tangi is the center of Kaji district of Hilmand province. It is neither a separate district nor a village. It only contains shops and markets and governmental offices. In the RFP it has been put as a separate district while it only the center of Kajaki district.

### 3.6 Musa Qala District




A total of 121 settlements were visited during the scoping survey in Musa Qala district of Hilmand province. Out of which 4 were classified as commercial, 1 semi commercial and 116 rural settlements. Totally 69 settlements were electrified and 52 were non-electrified.

## 5. Presence of governmental Offices and Donor Aid Programs.

### 5.1 Government Offices

It was observed during scoping survey by SDLR's enumerators that the government offices and government major authority for enforcing laws and rules except Kandahar and Lashkar Gah Centers are limited to the centers of the districts. Most of the rural settlements are under the control of anti government elements. Clinics, schools and other governmental welfare activities are abandoned in these areas. Schools and clinics and other governmental offices are only up to somehow functional in the centers of these districts.

### 5.2 Donor Aid Programs

There are donor aid ongoing programs in Kandahar and Lashkar Gah. There are very small scale low profile programs in Kajaki, Musa Qala and Sangin district which are not visible due to security concerns and the donors could not be identified.

There are no donor activities in rural settlements of Sangin, kajaki and Musa Qala districts due to the unsecure situation in these areas.

## 6. Total Settlements

SDLR surveyed totally 408 settlements as per the following criteria:

| SN | Name | Settlement Status | | | Total |
|---|---|---|---|---|---|
| | | Commercial | Semi Commercial | Rural | |
| 1 | Kandahar | 10 | 0 | 0 | 10 |
| 2 | Lashkar Gah | 7 | 2 | 26 | 35 |
| 3 | Kajaki & Tangi | 6 | 0 | 157 | 163 |
| 4 | Musa Qala | 4 | 1 | 116 | 121 |
| 5 | Sangin | 4 | 0 | 75 | 79 |
| **Total** | | **31** | **3** | **374** | **408** |

*For more details of settlements please see the completed list of scoping survey that has already been shared with SUPPORT/CHECCKI/USAID.*

## ANNEX L: FOCUS GROUP DISCUSSIONS

## Focus Group Discussion No. 1

**Category:** Electrical Utility

**Sub-category:** Kajaki Dam employees

**Date**: June 1, 2010

**Location**: Kajaki Dam, Helmand Province

**Participants:**

| Name | Job Title |
|---|---|
| Emandad | Team leader |
| Din Mohammad | Mechanic and Admain |
| Abdul Bassi | Mechanic |
| Alam Gul | Electrician |
| Abdul wasi | Electrician in side and out side |
| Khaudaidad | Mechanics |
| Mohammad Akhilas | Electrician |
| Saiyed Khan | Electrician |
| Taj Gul | Cook |
| Shaista Khan | Electrician |
| Joma Khan | Mechanic |

**Comments/suggestions/observations:**

1. All the workers live in the vicinity of the Hydro Power Plant
2. They only get electricity from the HPP 10% time
3. German engineers rehabilitated Unit 1 and it is working fine [apparently the FG members were not aware that USAID had funded this rehabilitation].
4. Chinese engineers rehabilitated Unit 3 and it started to have a problem with the 'quill' one year ago
5. In terms of priority for electricity, a] lighting b] fans c] water pump, then maybe iron, fridge
6. There is no industrial use for electricity in Kajaki district
7. No electric street lighting
8. Hardly any small diesel generators
9. Kerosene lamp expensive – 500 afs for 5 gallon – might spend 3-5,000 afs month

10. Lots of dire poverty in Kajaki, Sangin and MusaQala – can't afford kerosene
11. People see no real improvement in quality of life since 2001, hence support Taliban
12. Local inflation is high
13. petty crime is prevalent – robbery is " the Afghan job"
14. lots of mines still – dangerous – feel like "jailed bird in a cage"
15. on way to work, Dam staff must pass through 8 Taliban checkpoints
16. Dam employees must grow beards – not allowed to cut
17. Taliban will take away TV and radio
18. government does not collect tariff on electricity consumer, Taliban checks meters and demands payment
19. Why does Taliban cut transmission line? no answer
20. no schools
21. the connection charge ranges from 5 to 30 afs depending on distance from line
22. electricity seen as essential – basic need
23. month ago US Army came and promised to "open the Kajaki road"
24. All components now on site for Unit 2, but missing cement. – need 350,000 tons

## Focus Group Discussion No. 2

**Category:** **Business**

**Sub-category: Kandahar Industrialists**

**Date**: June 8, 2010

**Location**: Kandahar Chamber of Commerce

**Participants:** See table below, and in addition, Admin. Officer for Kandahar CoC , Eng. Abdul Bake 0700 300 650

**Comments/suggestions/observations:**

1. Immediately after overthrow of Taliban, things were good but since then the overall situation has deteriorated.
2. Business community optimistic after fall of Taliban and started many new factories in 2003/04 e.g., ice, cake, soup, cooking oil ,paper carton/boxes, cotton, dry fruits, fresh vegetables and Pepsi.
3. 129 factories in Kandahar have closed since 2003 resulting in loss of 12,000 jobs who are now 'free to rob and join Taliban'
4. Industrial park is 'ghost town'
5. Businessmen had invested in companies – purchased land, buildings, machinery & equipment, and hired and trained workers – only to see their efforts wasted – due to chronic shortage of public electricity.
6. Some business people keep on paying and feeding and transporting workforce even though idle – don't want to lose them
7. Go and invest elsewhere, skilled workers leave, local goods not available
8. Could meet many needs of local ISAF forces and ANA
9. Closed down businesses no longer export
10. Tough already to compete – Afghanistan landlocked with no sea port or railways
11. Current load shedding in Kandahar – almost impossible to rely on irregular 50%
12. Also voltage fluctuation from 220 to 380 V…burned out machines
13. Only 7-10 remain open but need their own generator but very expensive diesel and other operating expenses [e.g. one company 400 liters day @ 40-80afs?? = !!!!!
14. 1kwh costs US 0.27c
15. Ice surviving…why? Operate from sunset to sunrise

16. means less competitive as prices higher, or less profits
17. imported goods flooding local market – possible 'dumping' from Pakistan and Iran
18. Cold storage unit built by Indians and owned by government – presently rented to Chairman of Chamber for $ 500 month….but he can't afford electricity from generators [full of eggs from India and Pakistan and some grape plants]
19. Perceive donor bias in business loans – money going to Kabul enterprises [e.g. pomegranate Business Plan]
20. Frustrated by lack of action on the electricity front….lots of meetings, talk and promises but no result.
21. Do not understand why no action on Dahla Dam …could generate 2 MW
22. Where is 3rd unit on Kajaki Dam?

**Table 52: Kandahar Chamber of Commerce – Focus Group Discussion Participant Profiles**

| PARTICIPANT | | | | Business[es] operating in Kandahar now | | | | Kandahar Business[es] closed since 2003 due to electricity | | | | | Plans With electricity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | NAME owner | BUSINESS name | Cell | Main product | Investment $ | No. employees | $ per m. on genets | MAIN PRODUCT[S] | MAIN MARKET[S] L=LOCAL X=EXPORT | Total l lost/idle in $ | No. Workers laid off | No. Workers idle | # businesses re-pen or startup – type, employees, investment |
| 1 | Hajji Attalla Ahmadi owner . Hashemite Sahel General manager | 1.Etihad Beverages<br>2.Afghani Plastron. | 0799555572<br>0777300509 | 1.soft drinks<br>2.Plastic bags | 1.7 m<br>2. 4m | 1.200.<br>2.300 | | No2 operating 30%<br>3.Etihad Packing cake. | | $3m | 60 women | | Could 3x business no. 2<br>Could restart business no. 3, provided could find 60 females to employ |
| 2 | Hajji Nasorullah zaher. [Chairman of Chamber] | Amainkareem. Export and import Limited. | 0799831010 | 1.Dry and Fresh fruits Exporter.<br>2.Cold Storage reenter. | 500k | 1.23<br>2.30 | | Considering closing cold storage as cannot afford generator electricity | | | | | |
| 3 | Hajji Barayhdi Sadieq. | Hoarsen Sadieq Ice Industry. | 00700322552 | ICE | 400k | 20to30. | | ICE | For L | 250000,$ | 25 | 5 worker idle. | The Ice Industry. 20 to30 .employees. |
| 4 | Hajji Abdullah saiefi. | Aryan plastron Industry. | 0700306122 | Plastic bag box and ext . | 700k | 200 employees. | | Plastic bags box for export of fruit and some plastic puts. | For L and X | 300000.$ | 180. | 20 worker. | This Industry. The employees, well be up 300. |
| 5 | Haji Rahmeetullah | 1 .Exporter<br>2.Ahmadullah Food processing Industry | 0700300317 | Dry Fruit &Fresh Fruit exporter.<br>2.Food and vegetable seed Industry | 1.1.5m<br>2 250k | 1.62<br>2.50 to 40 | | Clear and pure food and vegetable seed for local market and export. | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | Hajji Yare Mohammed | Afghan Sorghar Industry | 0708579931 | | | | | | | | | | |
| 7 | Hajji Ehsanullah | Taqit oil and soup Industry | 0789119066 | Cooking Oil and Soup. | 1.5 m | 200, | | Oil .Soup. | | | | | Increase to300 jobs |
| 8 | AbdullBari Shakily | Shakily Brethren Industry limited | 0700300347 | | | | | | | | | | |
| 9 | Hajji Abdullaah | Poultry Farm and Fish Farm. | 0700324300 | Chicken and Fish. | 300k | 150. | | | | | | | Increase to 200 jobs |
| 10 | Abdul Rashid | Afghan Plastron | 0700305955 | 1,Plastic pipe<br>2. plastic cups and dishes | 8m | 10 workers. | | | | | | | |
| 11 | Basher Ahmad | Basher Ahmad limited | 0703232255 | Phone Off | | | | | | | | | |
| 12 | Roehl Allah Habbib | AbdullRahmin BaBa Limited. | 0700338826 | Re-bar [for constriction]. | 2.5 m | 110 | | | | | | | Increase to 300 |
| 13 | .Abdull Basher | Abdull Rahmin Ba Ba Limited. | 0799099023 | | | | | | | | | | |
| 14 | Hajji Mohammad Mohsun. | Kaiser Food Products Limited. | 0700297355 | Cake | 200k | 5 | | | | | | | |
| 15 | Hajji Mohammad Hale am. | Allmadeyna Oil products Limited. | 0700305584 | Oil | 200k | 150, | | | | | | | |

# ANNEX M: KEY INFORMANT INTERVIEW GUIDES

**INSTITUTIONAL**

**BUSINESS**

**COMMUNITY**

**ELECTRICAL UTILITY**

***These guides were used by the study team when talking to/meeting with 'key informants' to aid in questioning and note-taking….not as a questionnaire to be completed***

**Socio-Economic Impact Assessment of Electrification in Kandahar and Lashkar-Gah**

***Checchi Consulting, Afghanistan - SUPPORT Project***

KEY INFORMANT QUESTIONNAIRE

# INTERVIEW GUIDE : BUSINESS

## Purpose

Generic, semi-structured questions or 'checklist' for focus group discussions and for interviewing stakeholders or 'key informants' in Kabul and in the field - business representatives such as Chambers of Commerce Directors, business leaders, business owners – large, medium, small, micro – different sectors

## Introduction

Dr. Mafiz Islam and Denis Dunn are on a short-term contract with Checchi Consulting, Afghanistan [SUPPORT project], funded by USAID Program Office. SUPPORT carries out monitoring, evaluations and impact assessments on behalf of USAID.

We have been tasked to conduct an assessment of social and economic impacts of electrical supply improvements arising from the rehabilitation of Kajaki HPP units 1 and 3 , installation of diesel power generation sets [DPPs] in Kandakhar and Lashkar-Gah, and a sub-station in L-G for improving local distribution.

In order to conduct this assessment, we [the study team,] are gathering data on the effects of improved access to the electricity grid on a range of beneficiaries. To do this:

1. There is ongoing a survey of end users – households, settlements, markets and business owners in randomly selected settlements within Kandahar and Helmand Provinces
2. arranging focus groups
3. interviewing 'key informants' i.e stakeholders for anecdotal or qualitative information.

We would appreciate you answering some questions about the effects of improved electricity supply.

**Date:…….. Interviewer……**

**Person[s] interviewed……**
**……**

## Questions

1. When did the electricity supply improve [grid-electrified]?.....
2. How was your access to grid-electrification achieved – HPP or DPP?.....
3. What % of businesses in your community are still not connected to the grid? ……..
4. Do you know why they are <u>not</u> connected?

……..

……..

5. What are business owners/shopkeepers **using** grid electricity for?

……

……..

6. What other forms of power/energy do you use in your business?

……

7. What **difficulties** did you experience before you were connected to the grid?.....

8. Is the supply of electricity now constant or **interrupted**? ……..

9. If latter, how many **hours per day** [on average] is electricity available?.....

10. How many **days on average in a month** is electricity available?.....

11. Is electricity now **cheaper**? ……..

12. If so, by how much than before being connected? ……..

13. Are business people/shopkeepers able and willing to pay the price of grid electricity ?

……

14. In which ways is your business and/or the business community **benefitting** from improved electricity supply? [greater sales, more profit, more productivity, lower costs?]

……

……

……..

15. Are more new business being started since grid electricity? …….

16. If yes, what type, and how many?

……..

17. Have you or other businesses created more jobs since grid electricity? …….

18. If yes, how many and what types?

……

19. Are the jobs higher pay?

……..

20. What can the business community do to **take full advantage** of the improved electricity supply?

……

21. What **problems** currently exist with respect to the supply of electricity to your business?

……

**22.** What **future action** is needed to further improve the supply of electricity?

……

**23.** Are you aware of any recent **studies/reports** on electricity supply or the effects of improved electrical power? ……

**24.** Which **donors** and/or donor projects are active in the ESA in the field of electrical power/energy? ……

**25.** Other comments on grid electrification – better access to electricity

……

……

……..

*Be sure to exchange business cards and/or gather full contact details of all present in meeting.*

**Socio-Economic Impact Assessment of Electrification in Kandahar and Lashkar-Gah**

***Checchi Consulting, Afghanistan - SUPPORT Project***

KEY INFORMANT QUESTIONNAIRE

# INTERVIEW GUIDE : COMMUNITY

## Purpose

Generic, semi-structured questions or 'checklist' for focus group discussions and for interviewing stakeholders or 'key informants' in Kabul and in the field - community representatives such as Governors, community leaders, traditional leaders/elders, spiritual leaders, community organizers, aid workers, NGO Directors

## Introduction

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4. There is ongoing a survey of end users – households, settlements, markets and business owners in

randomly selected settlements within Kandahar and Helmand Provinces

5. arranging focus groups
6. interviewing 'key informants' i.e stakeholders for anecdotal or qualitative information.

We would appreciate you answering some questions about the effects of improved electricity supply.

**Date:…….. Interviewer……**

**Person[s] interviewed……**
**……**

**Questions**

**26.** When did the electricity supply improve [grid-electrified] in your community?.....

**27.** How was your access to grid-electrification achieved – HPP or DPP?.....

**28.** What % of your community is still not connected to the grid? ……..

**29.** Do you know why they are <u>not</u> connected?

……..

…….....

**30.** What is your community **using** grid electricity for?

……

……..

**31.** What other forms of power/energy do you use in your community [wood, kerosene, solar, gas, candles]?

……

**32.** What **difficulties** did your community before you were connected to the grid?.....

.....

**33.** Is the supply of electricity now constant or **interrupted**? ……..

**34.** If latter, how many **hours per day** [on average] is electricity available?.....

**35.** How many **days on average in a month** is electricity available?.....

**36.** Is electricity now **cheaper than before**? ……..

**37.** If so, by how much than before being connected? ……..

**38.** Are local people able and willing to pay the price of grid electricity ?

……..

**39.** If not, why not?

……

**40.** In which ways has your community **benefitted** from improved electricity supply? [health care, education, agriculture, security, crime,?]

……

……

……

……

……..

**41.** What can your community do to **take full advantage** of the improved electricity supply?

……

**42.** What **problems** currently exist with respect to the supply of electricity to your community?

……..

**43.** What **future action** is needed to further improve the supply of electricity?

……

**44.** Are you aware of any recent **studies/reports** on electricity supply or the effects of improved electrical power? …….

**45.** Which **donors** and/or donor projects are active in the ESA in the field of electrical power/energy? ……

**46.** Other comments on grid electrification – better access to electricity

……

……

……..

*Be sure to exchange business cards and/or gather full contact details of all present in meeting.*

**Socio-Economic Impact Assessment of Electrification in Kandahar and Lashkar-Gah**

***Checchi Consulting, Afghanistan - SUPPORT Project***

KEY INFORMANT QUESTIONNAIRE

# INTERVIEW GUIDE : ELECTRICAL UTILITY

## Purpose

Generic, semi-structured questions or 'checklist' for focus group discussions and for interviewing stakeholders or 'key informants' in Kabul and in the field - ELECTRICAL UTILITY representatives

## Introduction

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8. arranging focus groups
9. interviewing 'key informants' i.e stakeholders for anecdotal or qualitative information.

We would appreciate you answering some questions about the effects of improved electricity supply.

**Date:…….. Interviewer……**

**Person[s] interviewed……**
**……**

## Questions

**47.** Did they complete the '**Power Supply Measures'** table?

**48.** What is **capacity** of grid electricity in the ESA?.....

**49.** How much power is being **generated**?

……

**50.** How much power is being **received** in the ESA?

……

……

**51.** Is the supply of electricity now **interrupted**? ……..

**52.** If latter, how many **hours per day** [on average] is electricity available?.....

**53.** How many **days on average in a month** is electricity available?.....

**54.** How many **customers/connections** are there in the ESA ?

……..

**55.** What % of the ESA is NOT connected to the electrical grid? …….

**56.** Why not?

……

**57.** How many **new connection** do you make in one month on average? ……..

**58.** How much does it **cost** to connect a new customer ? ……

**59.** How much do people **pay** for electricity? ……..

**60.** Are local people **able and willing** to pay the price of grid electricity ?

……..

……

**61.** Are there problem with **collection**s ?

……..

**62.** What **problems** currently exist with respect to the supply of electricity in the ESA? .

……..

**63.** What **future action** is needed to further improve the supply of electricity?

……

**64.** Are you aware of any recent **studies/reports** on electricity supply or the effects of improved electrical power? ……..

**65.** Which **donors** and/or donor projects are active in the ESA in the field of electrical power/energy? ……

**66.** Any other comments on grid electrification – better access to electricity?

……

……

……..

*Be sure to exchange business cards and/or gather full contact details of all present in meeting.*

**Socio-Economic Impact Assessment of Electrification in Kandahar and Lashkar-Gah**

***Checchi Consulting, Afghanistan - SUPPORT Project***

KEY INFORMANT QUESTIONNAIRE

# INTERVIEW GUIDE : INSTITUTIONAL

## Purpose

Generic, semi-structured questions or 'checklist' for focus group discussions and for interviewing stakeholders or 'key informants' in Kabul and in the field - institutional representatives such as school principals, education ministry officials, hospital administrators, clinic nurses, agriculatural extension officers, agriculture ministry officials, energy and water ministry officials, security personnel, police officer

## Introduction

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11. arranging focus groups
12. interviewing 'key informants' i.e stakeholders for anecdotal or qualitative information.

We would appreciate you answering some questions about the effects of improved electricity supply.

**Date:…….. Interviewer…….**

**Person[s] interviewed…….**

## Questions

**67.** When were you connected to the grid i.e. electricity supply improved?

…….....

**68.** What % of your institution is still not connected to the grid? ……..

**69.** Do you know why they are not connected?

……..

…….....

**70.** What **difficulties** did you experience before your institution was connected to the grid?.....

.....

**71.** Is the supply of electricity now constant or **interrupted**? ……..

**72.** If latter, how many **hours per day** [on average] is electricity available?.....

**73.** How many **days on average in a month** is electricity available?.....

**74.** Is electricity now **cheaper**? ……..

**75.** If so, by how much than before being connected i.e. monthly savings in Afs?

……..

**76.** In which ways is your institution **benefitting** from improved electricity supply

……

……..

**77.** Is your institution now operating more efficiently and effectively? …….

**78.** If yes, please describe in which ways?

……..

**79.** Has employment increased at your instituton as a result of grid electricity? ……..

**80.** If so, how many and what type of jobs?

……..

**81.** What should your institution do to **take full advantage** of the improved electricity supply?

……

**82.** Do any **problems** currently exist with respect to the supply of electricity ?

……..

**83.** What **future action** is needed to further improve the supply of electricity?

……

**84.** Does your institution use any other form of energy/power?

……

**85.** Are you aware of any recent **studies/reports** on electricity supply or the effects of improved electrical power? ……

**86.** Which **donors** and/or donor projects are active in this area in the field of electrical power/energy? ……

87. Other comments on grid electrification/better access to electricity

……